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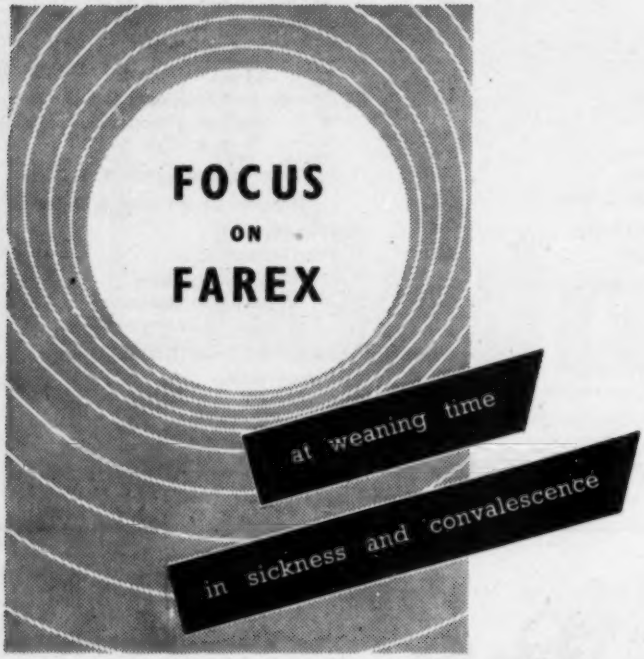


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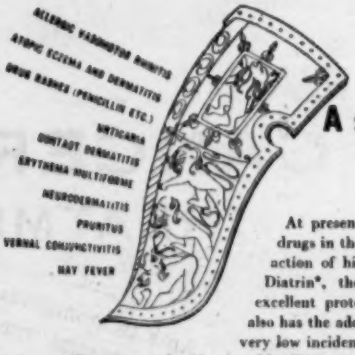


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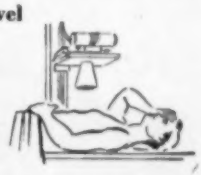

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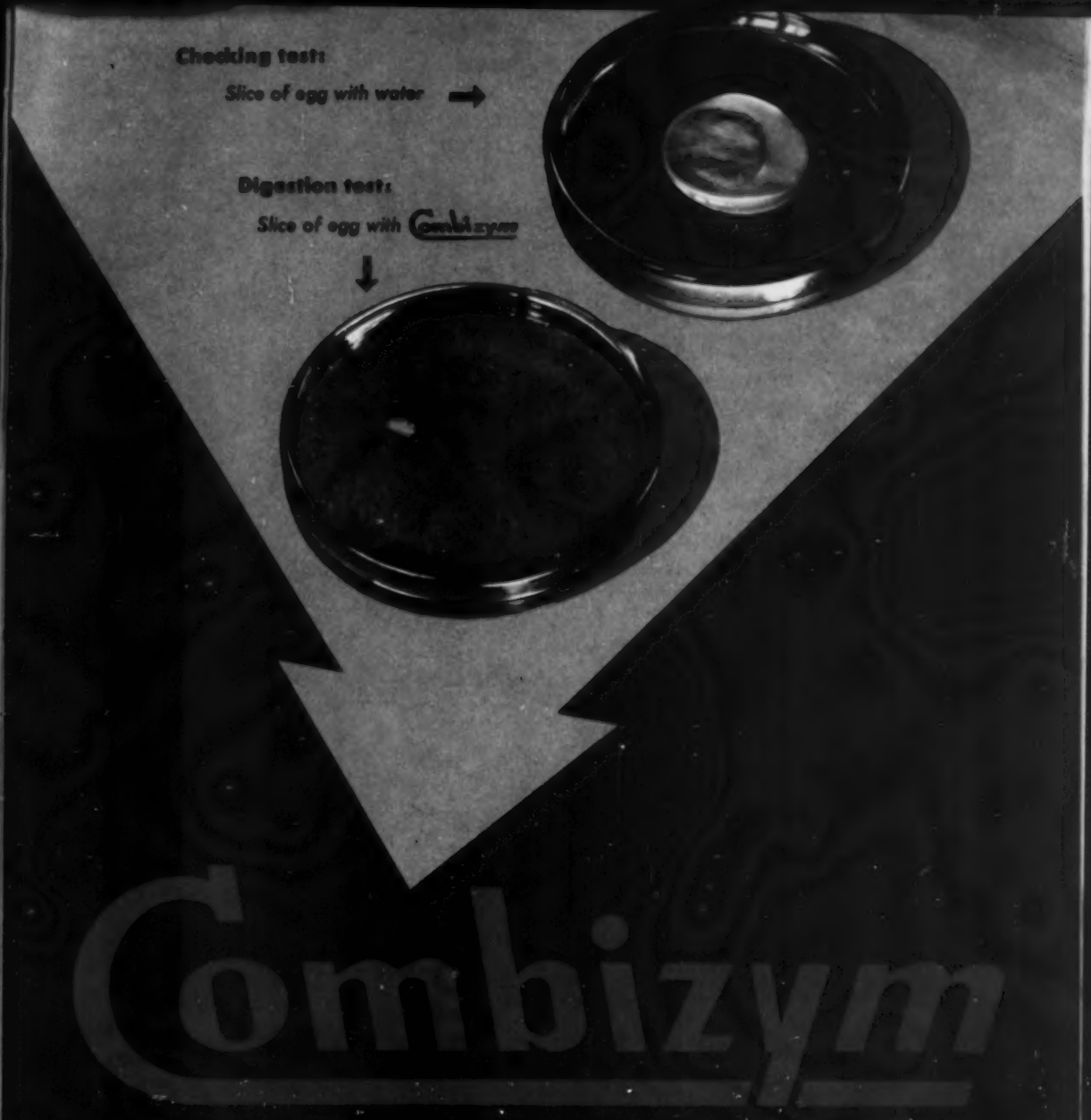


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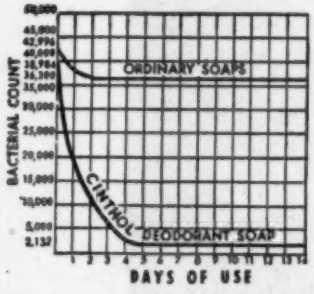


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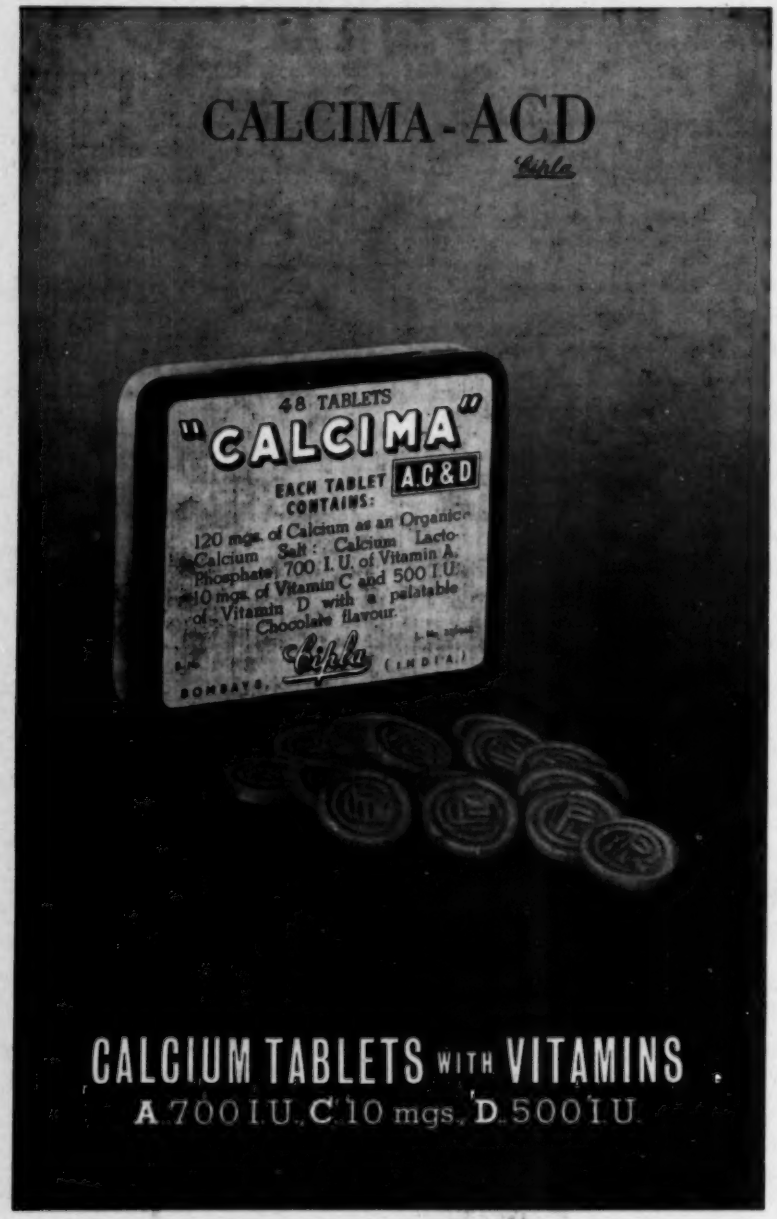
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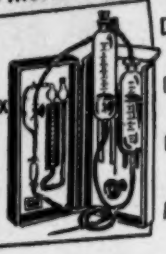

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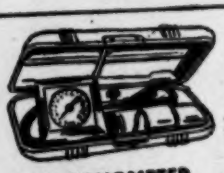

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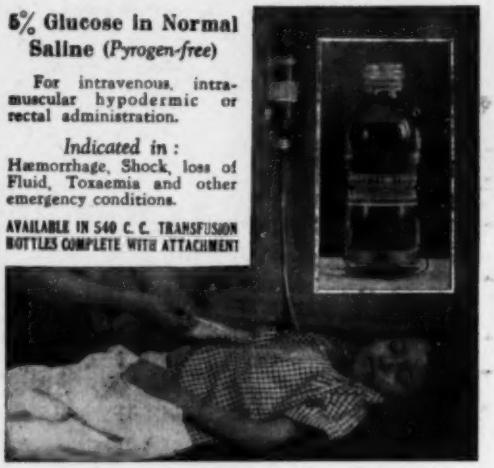

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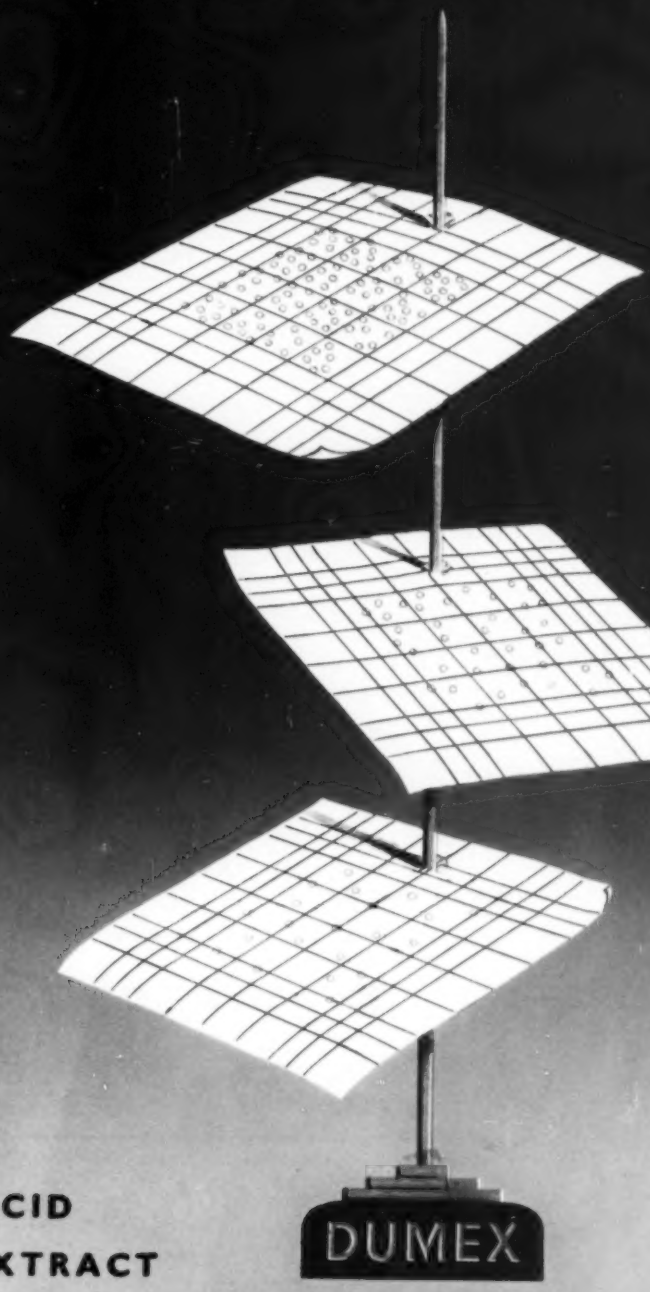


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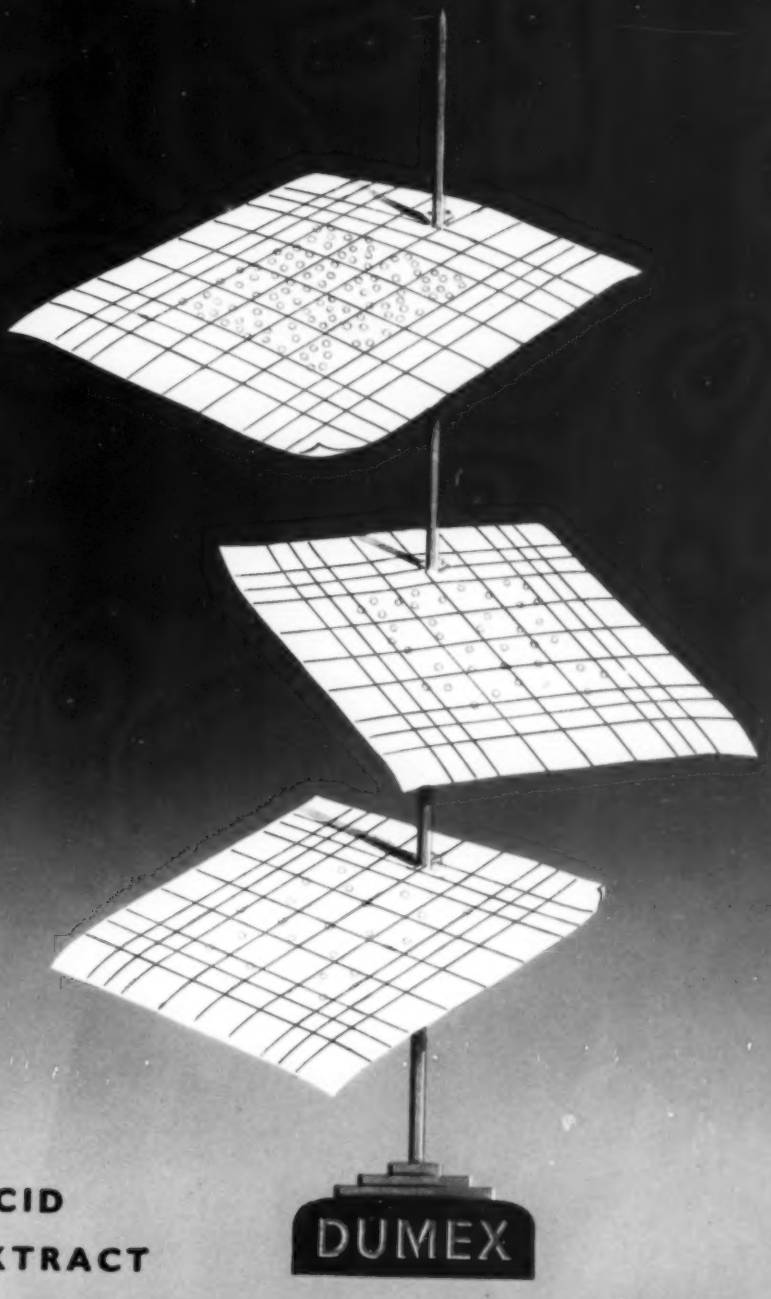


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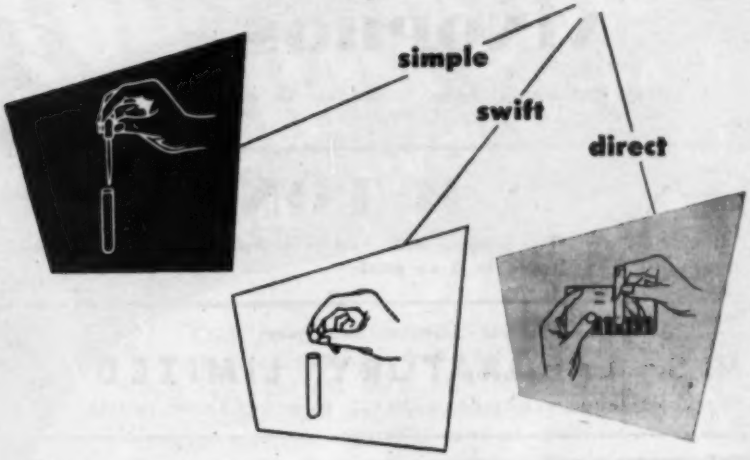


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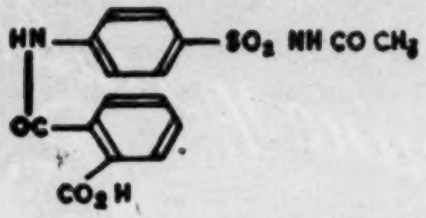


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# Journal of the Indian Medical Association

VOL. XXII. No. 9 CALCUTTA JUNE, 1953

*ORIGINAL ARTICLES*

## STUDIES IN IRON METABOLISM IN ANÆMIAS IN PREGNANCY

### I. Serum Iron

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AND
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*Eden Hospital for Women, Medical College, Calcutta*

The average middle class Indian dietary does not contain more than 5 to 6 mgm. of assimilable iron, less than half of which can be absorbed, because of the unsatisfactory composition of the diet, and the frequent occurrence of indigestion and dyspepsia. The effect of this is found in the frequency with which a state of iron deficiency is observed among certain groups of Indian population. This has been demonstrated by hæmatological surveys undertaken by Napier and co-workers (1935, 1937, 1938). When pregnancy supervenes on such deficiency states manifestations of iron depletion become still more evident owing to the drain on the iron reserves of the body, and the demands made by the fœtus. Mitra (1942) observed that nearly 33 per cent of the maternal deaths in India are due to anæmia complicating pregnancy. During the last 10 years conditions have not improved much, for during 1950-52 in one of the large maternity hospitals in Calcutta little over 26 per cent of the maternal deaths were attributable to anæmia. In a previous communication the author pointed out the frequency with which iron deficiency anæmia is found during pregnancy in this part of the country, and the manner in which these respond to intravenously administered iron (Mukherjee, 1951). In order to determine the extent of iron deficiency which may be present in an individual the concentration of iron in the serum forms a valuable index. Serum iron estimations were, therefore, undertaken in the present investigation on iron deficiency anæmias in pregnancy.

#### MATERIALS AND METHOD

The material for this study consists of a total of 196 cases. These have been divided into the following groups.

1. *Control series No. 1*: This consists of 20 normal non-pregnant females admitted into the gynæcological unit for the treatment of minor gynæcological disorders. Their hæmatological findings were normal. The hæmoglobin value ranged from 12·9 to 13·6 gm., the red cell count from 4·28 to 4·83 million, and the packed cell volume from 37·2 to 38 per cent. The volume and saturation indices varied from 0·98 to 1·0, and 0·96 to 0·99 respectively.

2. *Control series No. 2*: This consists of 50 cases of normal pregnancy. Ten patients in this series were followed from early pregnancy to term. The remaining 40 cases were between 28 and 40 weeks of gestation at the time of the investigation. This selection was considered necessary in obtaining the data for normal pregnancy, as most of the cases of anæmia in pregnancy in the present series also belonged to the same period of gestation. None of these patients presented any evidence of constitutional or organic disease. The hæmatological status also was normal considering the duration of gestation. The values for hæmoglobin, red-cell count, and hæmatocrit varied between 10·5 and 11·0 gm., 3·81 and 4·23 million, and 30·5 and 33·8 per cent, respectively. The volume index was 1·0 and the saturation index 0·97 to 0·98.

3. *The anæmia series*: This consists of 126 cases. The nature of anæmia in these patients was determined by complete hæmatological study. Bone-marrow biopsy was done in all cases. A fair number of megaloblasts was found in the marrow in 48 patients in this series. These were considered as cases of nutritional macrocytic anæmia in pregnancy. The remaining 78 cases showed normoblastic erythropoiesis. The hæmatological data of the two groups of cases are presented in Table 1.

Analysis of the gastric acidity was done with alcohol test meal in 104 patients in this series. This included all cases of nutritional macrocytic anæmia, and 58 cases of microcytic hypochromic anæmia. In 18 cases achlorhydria was observed, but this was not histamine fast. In 10 of these cases the anæmia was nutritional macrocytic in type. One of the achlorhydric patients had Plummer-Vincent syndrome. Glossitis and stomatitis were present in all cases of nutritional macrocytic anæmia, and in 6 cases of microcytic hypochromic anæmia. Splenomegaly was observed in 29 cases in this series, and hepatomegaly was found in 11.

TABLE 1—SHOWING HÆMATOLOGICAL DATA IN 78 CASES OF MICROCYTIC HYPOCHROMIC, AND 48 CASES OF NUTRITIONAL MACROCYTIC ANÆMIA IN PREGNANCY. (THE BASIS OF THIS CLASSIFICATION WAS THE ABSENCE OF MEGALOBLASTS IN THE BONE MARROW)

| | *Microcytic hypochromic* | | | *Nutritional macrocytic* | | |
|---|---|---|---|---|---|---|
| | *Average* | *Stand Dev.* | *Min.-Max.* | *Average* | *Stand Dev.* | *Min.-Max.* |
| Hæmoglobin Gm. % | 4·72 | 0·72 | 3·2 – 5·8 | 4·98 | 0·51 | 3·83 – 5·66 |
| R. B. C. mill./c.mm. | 2·42 | 0·64 | 1·78 – 2·97 | 1·41 | 0·42 | 0·95 – 1·89 |
| M. C. V. $c\mu$ ... | 70·7 | 3·81 | 62·3 – 75·5 | 103·4 | 5·54 | 96·3 – 114·6 |
| M. C. H. $\gamma\gamma$ ... | 19·5 | 1·41 | 17·1 – 22·9 | 34·6 | 1·33 | 32·9 – 36·4 |
| M. C. H. C. per cent | 27·5 | 1·23 | 23·3 – 29·0 | 34·1 | 1·29 | 33·0 – 36·8 |
| V. I. ... | 0·88 | 0.006 | 0·84 – 0·90 | 1·29 | 0·01 | 1·26 – 1·31 |
| S. I. ... | 0·80 | 0·61 | 0·77 – 0·85 | 0·98 | 0·007 | 0·95 – 1·0 |

Iron has been demonstrated to exist in the serum in at least three different forms (Vannoti and Delachaux, 1949), viz., (i) the free iron, (ii) protein-bound, or easily split iron, and (iii) undissolved iron which remains in combination with phosphates. Of these the first two can be readily utilised for hæmopoietic purposes, and these are the two fractions which are commonly determined in acid soluble form in serum iron estimations.

For the purpose of the present study the acid-soluble fractions were determined by treating the serum with 6N hydrochloric acid, and precipitating the protein with 20 per cent trichloracetic acid. Colour was developed by treating the centrifuged supernatant filtrate with 5N sodium thiocyanate, and the transmission read in a Leitz photoelectric colorimeter using a 540 $\mu$ filter. Standard iron ammonium sulphate solution containing 100 $\mu$gm. per cent of iron was used for preparing the calibration curve. Each estimation was done in duplicate, and a reagent blank was set up for each experiment. All usual precautions necessary for the estimation if iron in order to avoid extraneous contamination were meticulously adopted.

## RESULTS

1. *Control series No. 1*: The mean serum iron concentration in this group of 20 cases was 116·93 $\mu$gm. per 100 ml. The standard deviation of the mean was 9·40. The maximum value was 129·9, and the minimum 82·2 $\mu$gm. per 100 ml. As it was believed that the loss of blood during menstruation might interfere with the serum iron level the estimations in all cases were done 7 to 10 days prior to the onset of the period. A second estimation was done on each of these patients one day after the cessation of menstruation, and the values obtained were compared with those previously observed. In 12 cases the serum iron level was reduced to an extent of 6·4 to 18·5 $\mu$gm. per 100 ml. the average depreciation being 10·74 $\mu$gm. per 100 ml. The standard error of the difference in the serum iron level was 1·61. This difference was statistically significant. In 5 cases there was no appreciable alteration in the acid soluble iron content of the serum. In the remaining 3 cases the serum iron level was actually higher (10·3, 3·4, 4·4 $\mu$gm. per 100 ml.) than that in the premenstrual period. However, in these, the difference did not appear to be significant.

2. *Control series No. 2*: This consists of 50 cases of normal pregnancy. Of these the first 40 were selected at random between 28 weeks of gestation and term. The mean serum iron concentration in this group was 86·98 $\mu$gm. per 100 ml. The standard deviation of the mean was 14·16. The scatter in this group was wider than that in the first control series, and the values occupied a range of 50·3 to 120·0 $\mu$gm. per 100 ml. The average value obtained in this series of pregnant cases was only 74·4 per cent of the normal non-pregnant value cited above. The difference between the concentration of serum iron in the non-pregnant state, and in pregnancy is statistically significant. This is further shown by the fact that 97·5 per cent of values obtained at this period of pregnancy were less than the average minus twice the standard error in non-pregnant women, and that 45 per cent of the values were below the minimum observed in women who were not pregnant.

Ten patients in the present series were followed up from the third month of pregnancy up to term. Actually this follow-up series consisted initially of 21 patients. Of these 3 were lost sight of and so excluded. Eight patients developed varying degrees of anæmia (hæmoglobin less than 10 gm. per cent) between 28 and 34 weeks of pregnancy, and were therefore, transferred to the group of anæmias. The remaining 10 cases provided a satisfactory follow-up, and indicated the manner in which the serum iron concentration changed with the advancement of pregnancy. The results obtained in these patients are presented in Table 2. The data show that the serum iron level decreases during pregnancy, although this does not follow a uniform course throughout the period of gestation. In the present series, up to the twentieth week (i.e., during the first half) of pregnancy there was no significant fall in the concentration of the iron level of the serum compared to that in the non-pregnant state. The first significant decrease was noticed in the sixth month of pregnancy, and this continued to be progressive till the end of gestation. The rate of decline of the serum iron level was neither constant throughout the period, nor statistically significant at each stage. However, between 20 weeks of

TABLE 2—SHOWING SERUM IRON VALUES IN TEN CASES OF NORMAL PREGNANCY, FOLLOWED UP FROM 12 WEEKS TO TERM. (ALL VALUES ARE IN μGM. PER 100 ML.)

| | Weeks of Gestation | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40 |
| 1. ... | 131 | 127 | 129 | 125 | 110 | 92 | 93 | 82 |
| 2. ... | 117 | 120 | 122 | 102 | 98 | 95 | 90 | 74 |
| 3. ... | 124 | 125 | 120 | 108 | 98 | 90 | 84 | 68 |
| 4. ... | 120 | 112 | 118 | 116 | 94 | 94 | 90 | 73 |
| 5. ... | 98 | 108 | 104 | 108 | 92 | 86 | 80 | 62 |
| 6. ... | 106 | 100 | 100 | 94 | 88 | 80 | 70 | 54 |
| 7. ... | 114 | 112 | 116 | 110 | 100 | 92 | 86 | 78 |
| 8. ... | 127 | 130 | 126 | 114 | 108 | 102 | 94 | 90 |
| 9. ... | 122 | 124 | 125 | 120 | 110 | 106 | 98 | 85 |
| 10 ... | 129 | 123 | 115 | 106 | 92 | 90 | 84 | 72 |
| Average ... | 117·8 | 118·1 | 117·5 | 110·3 | 99·0 | 93·7 | 87·0 | 73·8 |
| Standard deviation | 10·89 | 9·21 | 6·24 | 7·92 | 8·22 | 7·72 | 7·92 | 9·31 |
| Standard error of the mean ... | 3·44 | 2·90 | 2·0 | 2·51 | 2·60 | 2·44 | 2·51 | 2·94 |

pregnancy and term the difference was considerable. In individual cases this varied from 36 to 54 μgm. per 100 ml. The average amounted to 44·9 μgm. per 100 ml. This is approximately 38 per cent of the initial serum iron value. It is more than 30 times the standard error of the difference, and of marked statistical significance.

The average of the last trimester of gestation of this follow-up series is 84·8 μgm. per 100 ml. The standard deviation is 11·58, and the standard error of the mean 2·12. The difference between the follow-up and the unselected series referred to above is of no statistical significance. It was therefore felt that the two groups could be compiled together with the advantage of obtaining a larger universe. The mean of the whole series of 70 values obtained from 50 patients was found to be 89·60 μgm. ± 12·77 per 100 ml. of serum The standard error of the mean was 1·51. The difference between the value in the last trimester of gestation, and that in non-pregnant women as well as that in the first half of pregnancy is of high statistical significance.

3. *The anæmia series*: The mean serum iron level in the whole series of 126 cases of anæmias in pregnancy was 51·68 μgm. per 100 ml. The standard deviation, and the standard error of the mean were 20·19 and 1·80, respectively. The coefficient of variation is high because of a wide scatter of values. The minimum was 3 μgm. and the maximum 98 μgm. per 100 ml. The difference of the mean serum iron levels in normal and anæmic pregnancies (38 μgm. per 100 ml.) is of high statistical significance. The value of 't' is 11·99. However, it has been mentioned already that the series of anæmia consists of two types of cases. The results of serum iron studies in these patients will therefore be presented separately.

*Group 1*—Microcytic hypochromic anæmia in pregnancy (78 cases). The serum iron values varied between 0 and 90 μgm. per 100 ml. The mean was 50·13 μgm. per 100 ml. ± 19·90. The standard error of the mean was 2·25. In 96·6 per cent of these cases the values were less than the average, and in 86·2 per cent they were less than the minimum observed in normal pregnancy. The difference between the means of these two types of cases (39·6 μgm. per 100 ml.) is of statistical significance, the value of 't' being 4·81.

TABLE 3—SHOWING FREQUENCY DISTRIBUTION OF SERUM IRON IN NORMAL FEMALES, LAST TRIMESTER OF NORMAL PREGNANCY AND IN PREGNANCY ANÆMIA

| | | | ANÆMIA IN PREGNANCY | | |
|---|---|---|---|---|---|
| *Frequency μgm./100 ml.* | *Non-pregnant 20 cases* | *Normal pregnancy 29-40 wks. 40 cases* | *Microcytic hypochromic 78 cases* | *Nutritional macrocytic 48 cases* | *Total 126 cases* |
| 0 – 10 | ... | ... | 6 | 3 | 9 |
| 10·1 – 20 | ... | ... | 4 | 1 | 5 |
| 20·1 – 30 | ... | ... | 8 | 4 | 12 |
| 30·1 – 40 | ... | ... | 8 | 5 | 13 |
| 40·1 – 50 | ... | ... | 22 | 10 | 32 |
| 50·1 – 60 | ... | 2 | 11 | 12 | 23 |
| 60·1 – 70 | ... | 7 | 10 | 6 | 16 |
| 70·1 – 80 | ... | 9 | 6 | 4 | 10 |
| 80·1 – 90 | 1 | 12 | 3 | 2 | 5 |
| 90·1 – 100 | 1 | 5 | ... | 1 | 1 |
| 100·1 – 110 | 4 | 4 | ... | ... | ... |
| 110·1 – 120 | 11 | 1 | ... | ... | ... |
| 120·1 – 130 | 3 | ... | ... | ... | ... |
| Average | 116·93 | 86·98 | 50·13 | 54·46 | 51·68 |
| Standard Deviation | 9·40 | 14·16 | 19·90 | 20·10 | 20·19 |
| Standard Error of the Mean | 2·10 | 2·24 | 2·25 | 2·90 | 1·80 |

Eight patients in the control series no. 2, who developed anæmia during the follow-up period are also included in this group. In all, the physiological depreciation of the serum iron was more marked than in normal cases. In 6 out of 8 cases this was manifested before the hæmoglobin level decreased appreciably. In the remaining 2 the change in both hæmoglobin and serum iron was almost synchronous. However, no

statistical correlation was observed between the rate of fall of the serum iron and that of the hæmoglobin, although after the appearance of anæmia the normal gradient of fall of the serum iron concentration during pregnancy was greatly exaggerated.

*Group 2*—Nutritional macrocytic anæmia in pregnancy (48 cases). The scatter of values in this group of patients was slightly wider than that of even the former group. The range of values was between 0 and 99 μgm. per 100 ml. The mean for the series was 54·46 μgm. per 100 ml. ± 20·10. The standard error of the mean was 2·90. The inter-group difference of the means is of no statistical significance. However, the mean in nutritional macrocytic anæmia is 34·2 μgm. per 100 ml. less than that in normal pregnancy, in the corresponding period of gestation. This difference is of statistical significance.

## Discussion

Study of serum iron concentrations in assessing the status of iron metabolism is of comparatively recent origin. It is believed that the acid-soluble iron in the serum exists in an easily transportable form, suitable for synthesis of hæmoglobin. Under normal conditions only a small amount of iron is excreted in the urine. The level of the serum iron thus indicates a balance between the rates of assimilation and utilisation of iron. This, however, does not take into account the intracellular iron which is added to the serum continuously through the process of cell-disintegration. Under normal conditions this accounts for only a small percentage of soluble iron present in the serum.

Considerable difference of opinion exists as to the normal serum iron level. A still greater controversy is present with regard to serum iron concentration during pregnancy. Much of this disagreement is due to the difference in methods employed by different observers in the estimation of serum iron. Thus, in non-pregnant individuals, values have been reported to extend between 88 (Albers, 1941) and 135 μgm. per 100 ml. (Vanotti and Delachaux, 1949). In communications of more recent years there has been a better agreement in normal values. Cartwright and Wintrobe (1949), Lundström (1950), and Ventura and Klopper (1951) give 104, 126 and 110 μgm. per 100 ml. respectively, as the average normal value. The present finding of 117 μgm. per ml. in normal non-pregnant women compares well with the figures cited above. The similarity of the serum iron levels in the Indian and European patients in spite of the gross difference of dietetic habits is interesting.

Since 1937 there has been more than a dozen communications on the alterations of serum iron during pregnancy. Four of these observations indicate that the serum iron level increases during pregnancy, the amount varying from 8 to 45 μgm. per 100 ml. at term. The remaining contributions on the subject point out that the serum iron level decreases during pregnancy, the maximum fall being observed at term. There is, however, no agreement in the literature as to the extent of the reduction of the serum iron concentration in pregnancy. The figures given by different authors vary from 28 to 70 μgm. per 100 ml. Brochner-Mortensen (1942), and Hemmeler (1946) also state that the value of serum iron falls during pregnancy, but do not provide adequate data to show the amount of depreciation. The present observation indicates that in the last trimester of gestation the concentration of the acid-soluble iron in the serum is reduced from the non-pregnant level by 27 μgm. per 100 ml. The follow-up study demonstrates that the fall in the serum iron level during pregnancy is progressive during the second half of gestation, the floor level being attained at term. At this period, in the present series of observations, the depreciation from the non-pregnant value was found to be 43 μgm. per 100 ml. Up-to-date data compiled from the literature are presented in Table 4. In the present state of our knowledge it is difficult to correlate the difference in the findings of the different authors. Too many variables are to be accounted for. Nevertheless, it will be evident from Table 4 that the majority of investigators agree on the point that pregnancy is attended with a decrease in the concentration of serum iron.

Table 4—Showing a Review of the Literature Revealing the Changes in Serum Iron Concentration at Full-Term Pregnancy

| Author | Serum iron μgm./100 ml. | | |
|---|---|---|---|
| | *Non-pregnant* | *Full-term pregnancy* | *Difference* |
| Heilmeyer and Plötner (1937) | 89 | 100 | +11 |
| Albers (1941) | 88 | 115 | +27 |
| Harjola (1946) | 95 | 114 | +19 |
| Rath and Finch (1949, 1950) | 94 | 102 | +8 |
| Vanotti and Delachaux (1949) | 135 | 180 | +45 |
| van Goidsenhoven and Lederer (1938) | 118 | 100 | −18 |
| Vahlquist (1941) | 123 | 59 | −64 |
| Sundelin (1942) | 118 | 48 | −70 |
| Dahl (1945) | 105 | 74 | −31 |
| Laurell (1947) | 108 | 80 | −28 |
| Hoch and Marrack (1948) | 123 | 83 | −40 |
| Cartwright and Wintrobe (1949) | 104 | 59 | −45 |
| Lundström (1950) | 126 | 82 | −44 |
| Ventura and Klopper (1951) | 110 | 72 | −38 |
| Mukherjee and Mukherjee (1953) | 117 | 74 | −43 |

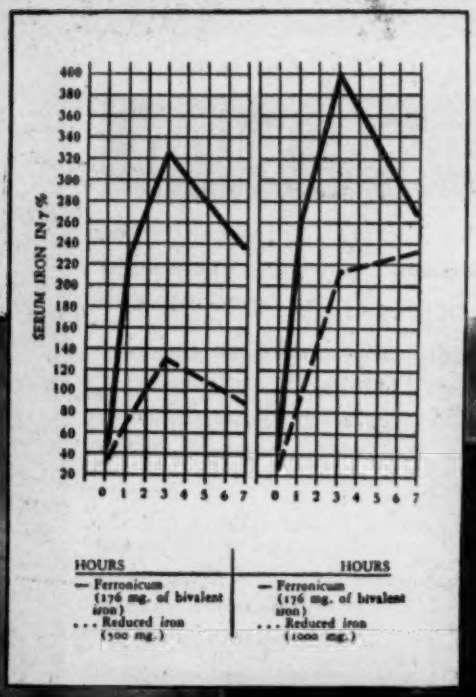
Few authors have followed the alterations of the serum iron level throughout the period of pregnancy. The present observation, based on a monthly follow-up of 10 cases, shows that up to the twentieth week of gestation there is no significant change in the level of the serum iron compared with that of the non-pregnant

'Dexedrine' is one of the safest drugs ever produced — 'Dexedrine' is one of the safest drugs ever produced — 'Dexedrine' is one of the safest drugs ever produced — 

*In Iron Deficiency Anaemia . . .*

# Ferronicum

**better absorbed and much better tolerated than any other oral iron preparation**




*The graph shows the better absorption of Ferronicum as compared to reduced iron. Small oral doses of Ferronicum increase the serum iron level far more than large doses of reduced iron (average from 5 patients). (Jasinsky, Schw. Med. Wschr., 80, 59, 1950)*

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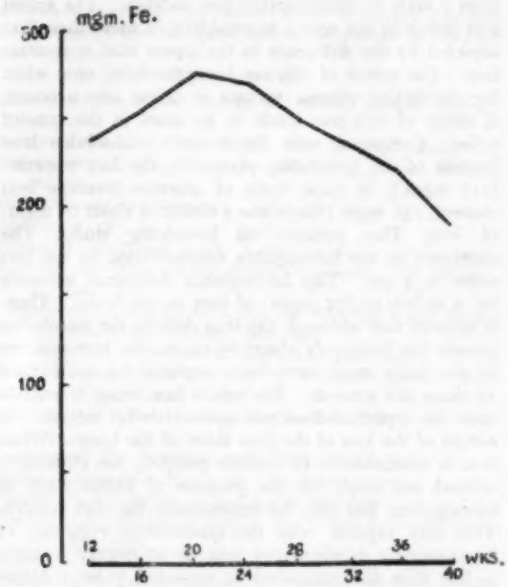


FIG. 1—ACID SOLUBLE SERUM IRON CONTENT OF THE BODY IN NORMAL GESTATION SHOWING THE VARIATION OF LEVEL WITH ADVANCEMENT OF PREGNANCY

women. The first noticeable fall appears in the second half of gestation. At term, when the level of serum iron is lowest, the depreciation amounts to 37 per cent of the non-pregnant value. This decrease in serum iron concentration does not appear to be due to hæmodilution of pregnancy. The total acid soluble iron content of the serum was estimated in 6 of the follow-up cases. The results are shown in Fig. 1, and Table 5. These clearly show that the serum iron content of the body actually decreases during the latter half of pregnancy. In the first half, however, there is actually an increase. In this period of gestation the fœtal demand is small. In the latter months of pregnancy this increases considerably, and between 38 weeks and term the fœtus stores about 5 mgm. of iron daily. The average diet of an expectant mother seldom contains enough iron to meet this heavy demand. This explains the deficit in the serum iron level in the latter months of pregnancy. The validity of this statement was tested on 28 cases of normal pregnancy. These patients were all carrying 38 to 39 weeks. The serum iron was estimated, and the hæmatological status determined. The hæmoglobin in all cases was normal (10·5 to 11·8 gm. per cent). The serum iron concentration was normal for this period of pregnancy. Each of these patients was then put on 25 mgm. of iron intravenously. This dose was chosen as the average iron requirement of pregnancy is believed to be 20 to 22 mgm. per day. The intravenous route of administration was employed in order to avoid the uncertainty of intestinal absorption. The treatment was continued for 7 days. At the end of this period the serum iron, and hæmoglobin were estimated again. The variation in the hæmoglobin concentration was negligible, but the behaviour of the serum iron was interesting. A summary of the results is presented below. It appears that if adequate iron is supplied during pregnancy, inspite of the demands made by the fœtus, the iron level of the serum of the mother can be maintained at a satisfactory, if not at the normal level.

TABLE 5—SHOWING CHANGES IN THE TOTAL ACID-SOLUBLE SERUM IRON CONTENT OF THE BODY WITH THE ADVANCEMENT OF PREGNANCY

| | *Total Serum Iron of the Body mgm. of acid-soluble iron* | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *W* | | *e* | *e* | *k* | *s* | | |
| | *12* | *16* | *20* | *24* | *28* | *32* | *36* | *40* |
| 1. ((I) | 232 | 260 | 274 | 264 | 242 | 230 | 214 | 175 |
| 2. (X) | 219 | 241 | 262 | 251 | 233 | 221 | 211 | 192 |
| 3. (VIII) | 248 | 270 | 286 | 280 | 261 | 240 | 222 | 185 |
| 4. (III) | 226 | 254 | 265 | 258 | 248 | 230 | 212 | 170 |
| 5. (IV) | 239 | 245 | 293 | 275 | 258 | 241 | 224 | 203 |
| 6. (VII) | 234 | 247 | 270 | 262 | 244 | 228 | 207 | 182 |
| Average | 233 | 253 | 275 | 265 | 248 | 232 | 215 | 186 |

*N.B.*—The decimals in these values have been corrected to the nearest integer. No statistical analysis is presented because of the smallness of the series. However, the changes are progressive, and uniformly manifested in all cases.

| | SERUM IRON µGM./100 ML. | |
|---|---|---|
| | *Original* | *After I. V. Iron* |
| Average ... | 80·6 | 111·8 |
| Min.—Max. | 67—102 | 99—126 |
| Standard deviation | 11·55 | 10·42 |
| Standard error of the mean ... | 2·18 | 2·0 |
| Difference ... | 27·8 | |
| Standard error of the difference ... | 2·78 | |

The reduction of the serum iron level in anæmias in pregnancy is a significant, but expected finding. In the present series of cases the average hæmoglobin level was 4·6 gm. per 100 ml. Compared to cases of normal pregnancy (average hæmoglobin, 10·78 gm. per cent) the serum iron level was deficient by 35 µgm. per 100 ml. This small deficiency in serum iron is hardly sufficient to explain the gross depreciation in the hæmoglobin level in anæmias. In the 8 follow-up cases who developed anæmia during the investigation, no correlation could be observed between the gradients of fall of the hæmoglobin and serum iron. Obviously the iron store of the body is markedly depleted. The low serum iron level merely indicates the poor status of iron metabolism complemented by the iron supplied to the circulation by the gastro-intestinal tract. The validity of this assumption will be shown by the two small series of experiments described below.

Each group consisted of 6 cases. After admission into the hospital all of them were put on a standard mixed diet yielding approximately 2,350 calories. Serum iron was estimated daily until three consecutive

estimations denoted an almost constant serum iron level in the fasting blood. This took about 5 to 7 days' continuous observation. At the end of this period the groups were separated. The first series was given one drachm of hydrochloric acid twice daily with meals, and the second a drachm each of sodium and magnesium sulphate each three times a day. The former was done with the object of improving the absorption of the dietetic iron, the latter to produce a state of diarrhœa, and thereby prevent the absorption of iron from the intestine. No iron-containing drug was given to any patient in either group. The patients were watched for one week, and the diet continued to remain the same. At the end of the period of observation serum iron was estimated again. It was found that in the first series the serum iron level increased in every patient, the extent varying from 22 to 45 μgm. (average, 34·4 μgm.) per 100 ml., whereas in the second series in all cases there was a fall in the serum iron level, the amount varying from 18 to 34 μgm. (average, 23·7 μgm.) per 100 ml. Although no statistical analysis was attempted because of the smallness of the series, the findings presented above are suggestive.

On the basis of these findings an attempt was made to determine if the basic status of iron metabolism in the body was actually lowered by the state of anæmia. Again, a series of 6 cases of pregnancy anæmia (hypochromic microcytic) were selected. An equal number of cases of normal pregnancy of approximately the same period of gestation were taken as control. After their basic serum iron level on a mixed diet was determined in the manner described above they were put on a diet consisting of milk, polished rice, sugar and tea. This diet has a negligible content of iron. After 7 days the serum iron was again estimated. It was believed that with the dietetic iron reduced to the minimum possible level the serum iron would indicate the level of iron metabolism. The results are presented below:

| | *Before iron deprivation* | *After iron deprivation* |
|---|---|---|
| | *μgm. per 100 ml.* | |
| Control | 94, 116, 78,<br>90, 102, 72. | 46, 78, 33,<br>55, 50, 30. |
| Anæmia | 34, 58, 42,<br>25, 66, 15. | 10, 18, 20,<br>10, 24, 5. |

*N.B.*—The data in the two columns represent corresponding values.

In spite of the smallness of the series these data leave little doubt as to the fact that the metabolic status of iron in pregnancy anæmia is low even when the fœtal demand is taken into consideration.

The difference in the status of the serum iron deficiency between microcytic hypochromic and nutritional macrocytic anæmia in pregnancy in the present series is not of great significance. Both alike suffer from a state of unfavourable iron balance. The actual iron deficit in the serum is considerably more than that depicted by the difference in the serum iron concentration. The extent of this can be appreciated only when the circulating plasma volume is taken into account. A study of this was made in 25 cases in the present series. Compared with the normal acid-soluble iron content of the circulating plasma in the last trimester (211 mgm.), in these cases of anæmia (average iron content, 146 mgm.) there was a deficit of about 65 mgm. of iron. This presents an interesting study. The difference in the hæmoglobin concentration in the two series is 5 gm. This hæmoglobin deficiency accounts for a deficit of 872 mgm. of iron in the body. Thus, it appears that although the iron debt in the circulating plasma has been only about 65 mgm., the iron reserves of the body must have been depleted by more than 10 times this amount. The serum iron being in a labile state its depletion does not quantitatively indicate the extent of the loss of the iron store of the body. When iron is administered to anæmic patients, the element is utilised not solely for the purpose of regeneration of hæmoglobin, but also for replenishing the iron reserve. This may explain why the quantitative response of intravenously administered iron in pregnancy anæmia is less than the calculated or expected value. Attention to this has already been drawn in a previous communication (Mukherjee, 1951). The same explanation applies for the lag period which has been observed (Govan and Scott, 1951: Mukherjee, 1951) between the commencement of intravenous iron therapy and the hæmoglobin response.

## Summary and Conclusions

The results of estimation of serum iron in 126 cases of anæmia in pregnancy are presented. The control series consisted of 50 cases of normal pregnancy. Of these 10 patients were followed-up month by month from 12 weeks to term.

It was found that compared with normal non-pregnant women pregnancy brings about a fall in the level of the serum iron in the second half of gestation. In the first half of pregnancy the serum iron concentration does not change appreciably from the non-pregnant level.

Anæmia in pregnancy was found to be associated with a greater reduction of the iron level of the serum. The difference between microcytic hypochromic, and nutritional macrocytic anæmias is not of great importance in so far as the serum iron concentration is concerned. The fall in the serum iron level in pregnancy anæmia is attended with a great depletion of the iron reserves of the body. The significance of the findings is discussed.

### Acknowledgments

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# ISOLATION OF M. TUBERCULOSIS FROM SPUTUM AND BODY FLUIDS

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The three most widely used procedures in the detection of tubercle bacilli are the microscopic and cultural examinations and animal inoculation test. Of these, the microscopic method, though very simple, rapid and readily applicable is not reliable enough to detect small number of bacilli as also it is not possible to say, with certainty, whether an acid/alcohol-fast group of microorganisms observed are really tubercle bacilli. Also, morphologically, it is extremely difficult to differentiate non-pathogenic acid/alcohol-fast microorganisms from tubercle bacilli. So far as animal inoculation method is concerned, this is time-consuming and costly. Whereas results of cultural examination may be obtained in 2 to 6 weeks, diagnosis by guineapig inoculation usually requires a minimum of 6 weeks.

The superiority of cultural methods over the direct microscopic examination is no longer a matter of controversy. The superiority of cultural methods over the animal inoculation, however, is still debatable. According to some workers cultural methods are as sensitive as, and in some cases, more efficient than the animal inoculation, while others have found, in comparative studies, guineapig inoculation to be superior to cultural methods. However, it cannot be denied that the cultural methods have the advantage of simplicity, rapidity and economy over animal inoculations.

The chief factor affecting the isolation of tubercle bacilli by culture is the preliminary treatment of the specimen in order to destroy the contaminating microorganisms. This is usually accomplished by digestion of the tenacious mucus and cellular debris by chemical agents followed by centrifugalisation to ensure concentration. An ideal digestant should be lethal and inhibitory to all organisms except tubercle bacilli.

Griffith (1914), using sodium hypochlorite (i.e., Labarraque solution) found that successful uncontaminated cultures of tubercle bacilli would result if cultures were made at short intervals from digested materials on suitable media. Petroff (1915) used 3 per cent sodium hydroxide for 30 minutes for the same purpose. Later, in 1924, 3 per cent hydrochloric acid and 6 per cent sulphuric acid were also tried with success, for short period exposure up to an hour or so. In each case, however, the reagent was prepared from liquid materials of uncertain composition or from solids, such as sodium hydroxide, not very easy to handle or weigh and subject to changes of absorption of carbon dioxide from the air or capable of corroding the glass containers in which they are stored. The need for a crystalline solid of high purity and stable composition was felt and satisfied with the introduction of 5 per cent oxalic acid. This reagent was easily prepared and could be kept well ready for use.

Robinson and Stovall (1947) compared sodium hydroxide digestion and concentration with a number of other methods, such as (1) alkalies, e.g., calcium hydroxide, ammonium hydroxide; (2) acids 6 per cent, sulphuric acid; (3) animal ferments (trypsin); (4) organic solvents; (5) vegetable ferments (caroid) and came to the conclusion that due to the wide variation in results obtained with the use of these new methods, there was little, if any, advantage over digestion with normal sodium hydroxide.

Oliver and Reusser (1942) compared the chlorox method with sodium hydroxide and found that since chlorox was lethal to tubercle bacilli this method was not satisfactory for preliminary digestion of material.

In order to find suitable chemical reagents which could replace sodium hydroxide or oxalic acid, Corper

and Stoner (1946) used chemically pure tri-sodium phosphate (TSP). They found that in 10 per cent solution (23 per cent $Na_3PO_4$ 12 $H_2O$), it could remain in contact with tubercle bacilli for a week at room temperature without destroying even small numbers, but it destroyed considerable number of contaminants in sputum in 24 hours at 37°C. or within several days to a week at room temperature. Van Vrankem (1947) compared the oxalic acid and T.S.P. digestants and concluded that T.S.P. was superior to oxalic acid. Mitchell, Jefferies and Stucker (1948) placed T.S.P. solution in screw-capped bottles before these bottles were sent out for collection of sputum so that when these bottles arrived the sputum was already digested and decontaminated. Cummings, Patnode and Spendlove (1949) studied the toxicity of the most commonly used digestive reagents and their results indicated that sodium hydroxide and T.S.P. were the most suitable digestants. Beattie (1949) compared the efficiency of hydrochloric acid and trisodium-phosphate as digestants and stated that the use of T.S.P. may adversely affect the growth of tubercle bacilli. Mullahy (1950) compared sodium hydroxide and T.S.P. as digestants on 300 specimens and found that nearly twice as many cultures were contaminated in T.S.P. method of digestion as in the sodium hydroxide procedure. According to the Laboratory Sub-committee of the American Trudau Society, the sodium hydroxide method was considered the most reliable one in general use.

In order to compare the efficiency of these methods of digestion and concentration, viz., sodium hydroxide and T.S.P. in the isolation of *M. tuberculosis* from pathologic material, a study of these two digestants was undertaken in this laboratory.

This communication records the results obtained in over 200 samples of material suspected to contain tubercle bacilli.

## Materials and Method

Material received for examination included sputum, urine, body fluids like pleural fluid, ascitic fluid, etc., either from hospitals or from private practitioners. During the 8 months from February to September 1952, 235 specimens were examined by sodium hydroxide and T.S.P. concentration methods. These included 200 samples of sputum, 7 samples of urine, 27 samples of fluids and 1 sample of cerebrospinal fluid.

In recent years many satisfactory methods for the cultivation of *M. tuberculosis* have been developed. It was found by the Tuberculosis Evaluation Laboratory of U. S. Public Health Service that Jensen-Holm modification of Lowenstein medium was the most efficient culture medium for routine diagnostic use. The same medium was used in this laboratory for the routine culture of *M. tuberculosis*.

The two methods employed for the digestion and concentration of pathologic material were as under:

1. *The Sodium Hydroxide Concentration Technique*—A 4 per cent (normal) solution of sodium hydroxide (B.P.) pellets (May and Baker) was used as a digestant. Equal volumes of specimen such as sputum (in case of urine, CSF and body fluids—the centrifuged deposit was taken) and the digestants were thoroughly mixed and the mixture incubated at 37°C., for half an hour, then neutralised with 4 per cent hydrochloric acid using phenol red (0·04 per cent aqueous sol.) as an indicator. It was centrifuged at high speed for about half an hour and the sediment inoculated on to two tubes of Lowenstein medium. The cultured tubes were paraffined and placed in the incubator at 37°C. Results were recorded at weekly intervals, for evidence of any growth. Period of observation was 2 months after which a negative result was given.

2. *The T.S.P. Concentration Technique*—A 23 per cent solution of hydrated salt of T.S.P. ($Na_3PO_4$ $12H_2O$) C.P. (Baker's analysed chemical reagent) was used as a digestant. In equal volumes, the specimen was mixed thoroughly with the digestant (in case of urine, CSF and other fluids, centrifuged deposit was used for treatment) and the mixture kept in the incubator at 37°C. for 24 hours, then centrifuged and supernatant fluid discarded. The deposit was mixed thoroughly with saline and then centrifuged again at high speed for about half an hour. The sediment was then inoculated on to two tubes of Lowenstein medium. The tubes were paraffined and kept in the incubator. Results were read at weekly intervals. The period of observation was 2 months after which a negative result was given.

## Results

Comparative results of sodium hydroxide concentration technique and T.S.P. concentration technique in the isolation of *M. tuberculosis* in case of 200 sputum samples are set out in Table 1. 105 strains of A.F.B. were isolated from 200 samples of sputum subjected to treatment by sodium hydroxide concentration method. Of these, 55 samples were positive in direct smears as well as on cultural examinations, while the remaining 50 strains were isolated from sputums which were negative in direct microscopic examination. There were 59 cases in which neither smear nor culture were positive.

Table 1—Showing Comparison of the Results of Two Concentration Techniques (Sodium Hydroxide Concentration Method and Tri-Sodium Phosphate Concentration Method in Case of Sputum)

| *Technique* | *Smear +ve Culture +ve* | *Smear +ve Culture −ve* | *Smear −ve Culture +ve* | *Smear −ve Culture −ve* | *Contamination. Results inconclusive* | *Total* |
|---|---|---|---|---|---|---|
| Sodium hydroxide | 55 | 8 | 42+8=50 | 59 | 28 | 200 |
| Trisodium phosphate | 27 | 40 | 8+4=12 | 107 | 14 | 200 |

*N.B.*—Out of 105 strains 8 were atypical A.F.B. and hence not included under *M. tuberculosis*, as they showed chromogenic characters.

In the case of T.S.P. concentration technique, 39 strains of A.F.B. were isolated of which 4 were acid-fast saprophytes. There were 27 cases in which both smear and culture were positive while 8 specimens were positive by cultural examinations only. Remaining 107 specimens were found negative both by smear and culture.

In the case of other specimens such as urine, body fluids, etc., the number of specimens subjected to treatment by both the concentration techniques was not sufficiently large and the results, therefore, cannot be considered significant. In the case of urine, no *M. tuberculosis* could be isolated from any one of the 7 samples treated by both the methods, the two strains isolated in each case showed saprophytic character.

In the case of other body fluids, out of 27 samples tested by both methods, 6 strains of *M. tuberculosis* were isolated by the sodium hydroxide concentration technique, while only one strain could be isolated by the T.S.P. concentration method.

As for contaminations, the total number of cases remaining contaminated even after treatment with sodium hydroxide were 8, while none after treatment with T.S.P.

## Discussion

From the above results it would be observed that the total number of positive isolations obtained by subjecting the specimens to the preliminary treatment by sodium hydroxide is much greater (44 per cent) than those obtained by treatment with T.S.P. (16 per cent). In some samples, which showed large number of acid-fast bacilli in direct microscopic examination of the material no growth could be obtained in cultures even after two months when the material was primarily treated with T.S.P., while *M. tuberculosis* was isolated from same samples much earlier in cultures treated with sodium hydroxide. Moreover, while most of the positive isolations by sodium hydroxide method resulted in from 20 to 30 days, large number of positive samples subjected to treatment by T.S.P. showed no visible growth even at the end of 4 weeks. This showed that T.S.P. had retarding and, to a less extent, some inhibitory action on the growth of *M. tuberculosis*.

T.S.P. treatment has no doubt a superior inhibitory action on contaminants. In this series 28 cases of contamination occurred in material treated with sodium hydroxide and only 14 cases when treated with T.S.P.

The number of acid-fast saprophytes encountered in cultures primarily subjected to sodium hydroxide treatment is much more (8 samples of acid-fast saprophytes) than those seen in cultures with T.S.P. treatment, thus showing that the saprophytes are inhibited by T.S.P.

Eight strains of acid-fast bacilli were isolated by both the concentration methods, viz., sodium hydroxide concentration method and the T.S.P. concentration technique. Six out of eight strains showed confirmatory evidence of *M. tuberculosis* in guineapigs, whereas the other two were negative by guineapig inoculation test. The two remaining ones may be considered non-virulent.

Six strains of acid-fast bacilli which were isolated only by the sodium hydroxide concentration technique and could not be cultivated by the T.S.P. concentration method showed macroscopic as well as microscopic evidence of *H. tuberculosis* in guineapigs. This is significant in that even virulent tubercle bacilli could be inhibited by T.S.P. method.

Finally, although T.S.P. is a superior decontaminating agent, it is at the same time inhibitory to growth of tubercle bacilli on culture media.

## Conclusions

1. Number of positive isolations of *M. tuberculosis* by sodium hydroxide concentration technique is greater than that by T.S.P. technique.

2. T.S.P. concentration technique carried out simultaneously for the same sample showed a distinct retarding of growth and to a less extent inhibition of the growth of *M. tuberculosis* in the direct cultures.

3. T.S.P. technique has a superior inhibitory action on contaminants and on acid-fast saprophytes.

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# SODIUM FLUORIDE THERAPY IN FILARIASIS

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The treatment of filariasis is still in a very unsatisfactory state. Particularly for the elephantoid leg and scrotum, medical treatment so far available is very poor. In 1945, late Dr. Venkatachellam Pillai, Prof. of Pharmacology in Madras, noted that incidence

of filariasis was nil in places where fluorosis was endemic. This made him try sodium fluoride for filariasis. He made a 1 per cent solution and was administering the same orally. At his suggestion, I tried the same as injection. The result though encouraging was not taken up seriously.

Last year, owing to unsatisfactory results of treatment of filariasis I once started giving in a case of well-marked swelling sodium fluoride 1 per cent 1 c.c. subcutaneously, once a week, for four weeks. At the end of 4 weeks' treatment, no further injections were given for one month and again another course was given. In some cases smarting pain used to occur soon after injection lasting from a few minutes up to half an hour. In no case was the pain so severe as to necessitate discontinuing the treatment. In some other cases, after the first injection there was a tendency for the latent condition to flare up. In still others it caused filarial fever or lymphangitis to occur. Since this reaction was observed regularly, sodium fluoride therapy was preceded by the administration of sulphadiazine 1 gm. three times a day for a week. In some other cases one course of Hetrazan or Banocide tablets was given. After this regime was started, no reaction was observed in any of the cases. This treatment outlined above was given to 16 patients and the result of the same is given in the tabular statement below.

It was observed that as injections progressed, the swelling came down and at the end of the 4 injections, the swelling was definitely less than at the start. After

TABLE—SHOWING ANALYSIS OF THE RESULTS OBTAINED WITH SODIUM FLUORIDE INJECTIONS

| *S. No.* | *Name* | *Age* | *Sex* | *Site of swelling* | *No. of injection* | *Local condition before treatment* | *Condition after treatment* |
|---|---|---|---|---|---|---|---|
| 1. | Mr. D. | 45 | M | Forearm | 4+4 | Swelling of the forearm near wrist | Improvement and less swelling |
| 2. | Mrs. D. | 33 | F | Dorsum lt. foot | 4 | Slight fulness over dorsum & ankle | Good improvement. No noticeable swelling |
| 3. | Miss K. | 24 | F | Leg and foot | 4 | Slight swelling | Not seen after treatment—good result |
| 4. | Mrs. K. | 30 | F | Dorsum lt. foot | 4 | Moderate swelling | Not seen after treatment |
| 5. | Mr. N. | 22 | M | Thigh | 4 | Mild swelling and lymphangitis | Very good result. No trace of swelling |
| 6. | Mrs. M. | 30 | F | Dorsum lt. foot | 4 | Moderate swelling | Sen at the end of one month; good response |
| 7. | Mr. J. | 30 | M | Left leg & dorsum lt. foot | 4+4 | Moderate swelling | Swelling much less |
| 8. | Mr. E. | 26 | M | Forearm rt. & dorsum of hand | 4 | Moderate swelling visible and œdema | Improvement not marked |
| 9. | Mr. H. | 35 | M | Left foot | 4 | Moderate | Good result |
| 10. | Mr. R. | 32 | M | Left leg & dorsum of lt. foot | 4 | Mild swelling | Improvement not yet noticed; too early to assess |
| 11. | Miss N. | 13 | F | Rt. foot & leg | 4 | Moderate | Improvement; not seen afterwards |
| 12. | Mr. K. | 21 | M | Right leg | 4 | do. | do. |
| 13. | Mr. K. | 50 | F | Right leg & foot | 4+4 | Advanced | No marked change in right but moderate improvement in left leg |
| 14. | Miss G. | 25 | M | Right & left leg | 4 | Moderate | Marked reduction noticed |
| 15. | Miss L. | 23 | F | Left foot | 4 | do. | do. |
| 16. | Mr. D. | 33 | M | Right leg | 5 | Advanced | No change noticed; no fever—slight reduction in swelling |

4 injections, no further injections were given. The patient was asked to report once a fortnight and the condition was observed. If at the end of three months the swelling was still present, another course of 4 injections was given as at the beginning; provided the swelling was only moderate in size i.e., up to 3 times the normal leg, it was reduced to the size of a normal leg. In cases of gross swelling, there was not much appreciable effect noted. Even if no appreciable effect was noted patients observed that the fever which they used to get periodically before the commencement of this treatment, had ceased. They also felt better after the course of treatment was over. It is not possible to say how far a psychological element is responsible for the sense of the well-being at this stage. This year I had an acute case. The man was admitted with fever, adenitis and femoral vein thrombosis with soft pitting secondary œdema of the leg. The groin glands were exquisitely tender. Night blood showed microfilaria in large numbers. The preliminary sulphadiazine therapy controlled the temperature but had no effect on the microfilaria. He was then started on anti-coagulants and sodium fluoride injections. After the first injection, the tenderness of the groin glands came down appreciably and the microfilaria were also reduced in number. After the second injection they completely disappeared. Owing to the difficulty of keeping acute cases for a longer time and doing filarial

count every night, more cases could not be observed. This patient got over the œdema as well as the adenitis. He was discharged and advised to report for further injections. Unfortunately he did not turn up.

In two cases of hæmatochyluria, both of more than a year's duration, sodium fluoride therapy was tried. There was gradual improvement as the injections progressed and at the end of the 4th injection, in both of them, hæmaturia and chyluria ceased. In the first case it is now three months since the cessation of treatment. In the second case it is now two months since the treatment is over. Yet both are free from the complaint. It is as yet too early to say how long they will maintain the improvement. In the absence of satisfactory treatment for this condition and in view of the good results achieved with sodium fluoride, this is worth trying in this complication of filariasis.

In one case of filarial scrotum not included in the accompanying table, after the second injection, the patient had fever for sometime and it turned out to be a filarial abscess of the scrotum which responded very well to sulphadiazine, incision and drainage. Thus the main drawback of sodium fluoride seems to be the tendency to precipitate reaction. If this is avoided by preliminary treatment with sulpha drugs this can be warded off. The local pain at the site of injection is lessened by diluting the solution to 2 c.c. with distilled water or by adding ½ c.c. 1 per cent novocaine. All the cases included in the table are cases in which the swelling had lasted for some years and had failed to respond to other lines of treatment. Though some others have claimed Hetrazan as having brought about reduction in the filarial leg, it had no effect in any of my cases. Where the filarial swelling has lasted for more than a year Hetrazan or similar drugs have no effect on the swelling. It is for these cases that sodium fluoride is most valuable. In a small percentage of cases, on the day following the sodium fluoride injection, patients complain of stiffness in the limbs, particularly in the shoulder region; but this is not seen in all cases.

The treatment suggested above is a very simple one and is also very cheap. Filariasis is highly endemic and affects extremely poor people who cannot afford costlier treatment like Hetrazan. Sodium fluoride may be given to them after administration of sulphadiazine for five days. Some of the cases have been followed now for two or three years without a recurrence of the swelling. The amount of sodium fluoride that is administered to produce the therapeutic response is not likely to bring about any toxic symptoms of fluorosis.

### Summary and Conclusion

Sodium fluoride, 1 per cent 1 c.c. subcutaneously for 4 weeks, at weekly intervals, is suggested for filarial legs.

2. The results in the 16 cases reported are uniformly good, the treatment is successful in moderate size filarial legs.

3. The drug is cheap and the dose suggested is free from toxicity.

Acknowledgment

I am thankful to my assistant Dr. C. T. Hemachandran for having collected the material and looked after the patients during the course of treatment, and to the Director of Medical Services, Madras, for permitting me to write this brief note.

## HÆMATOLOGICAL STUDIES IN NEWBORN INFANTS

BHOLANATH BANERJI, M.B.,

*Howrah*

Hæmatological studies in newborn infants have engaged the attention of investigators for a long time. In most cases, findings have been at variance due to lack of standard methods of examination. The subject offers many interesting features of physiology in respect of sudden change of environment at birth and in early neonatal life. Lipmann (1924) quoting Bayer pointed out that the first published figures on the blood of the newborn was that of Dennis. Williamson (1916) for the first time employed a definite standard of 16·9 gms. of hæmoglobin per 100 c.c. of blood as 100 per cent. Guest, Brown and Wing (1928) pointed out that the percentage does not give the exact idea of hæmoglobin content. Williamson (*loc. cit.*) and Khumbhar (1932) found 23·9 grams per 100 c.cm. or from 165 to 170 per cent (Haldane) as the hæmoglobin content of babies at birth. Whitby and Briton (1947) on examination of twenty samples of blood from umbilical cord found that the average hæmoglobin content of 20 gm. per cent (145 per cent, Haldane); Guest, Brown and Wing (*loc. cit.*) obtained 17·9 gm. per 100 c.c. of blood as the average hæmoglobin content. Waugh, Merchant and Maughan (1939) using 15·6 gm. of hæmoglobin as standard found the average value for umbilical cord blood as 15·36 gm. The average hæmoglobin values of Indian babies quoted by authors in this country are as follows:—Dhar (1934)—18·98 gm. per 100 c.c.; Mukherjee (1944)—20·60 gm. per 100 c.c.; and Datta Choudhury (personal communication)—15·79 gm. per 100 c.c.

The red cell count values show wider variations. Goldbloom and Gotlieb (1929) mentioned that the erythrocyte count might vary from 5·1 to 7·1 million per cubic millimeter of blood. Lucas *et al* (1921) obtained 5·51 million per cubic millimeter and Aitken (1902) found 7·68 million per cubic millimeter. Mayers (1922) reviewed the literature and found 5·72 million as the average figure of erythrocytes. The average figures of Indian workers are as follows:

Dhar (1943)—5·08 million per c.mm.

Mukherjee (1944)—6·07 per c.mm.

Datta Chowdhury (personal communication)—4·5 million per c.mm.

Mackay (1931a and 1933c) emphasizes that hæmoglobin estimation varies with the technique and also with the site from which the blood is obtained. Schiff (1892) pointed out that the differences in the values might be due to environment and geographical location. Demarsh, Windle, Alt and Hills (1941) pointed out that the average values of hæmoglobin and red blood corpuscles varied with the time of tying umbilical cord.

## Materials and Methods

The present study has been based on investigations of both cord blood and peripheral blood obtained from heel of 23 newborn infants. Both the cord blood and the heel blood were taken almost simultaneously immediately after birth in the labour room. Only full term normal babies born naturally of mothers without any disease such as gross anæmia, cardiac disease, toxæmia, placenta prævia, etc., were selected for examination. Newborn infants' blood was obtained by a deep stab on the lateral side of heel with a cataract knife. The blood which flowed freely was taken with a hæmocytometer pipette for R.B.C. examination and a Sahli pipette for hæmoglobin estimation. Subsequent to birth, the peripheral blood obtained from heel has been examined on 3rd, 4th-5th days, 6th-7th days. Hæmoglobin count, red blood cell count, reticulocyte count and in some cases icteric index were determined. Hæmoglobin estimations were done by the Sahli hæmoglobinometer (Hawksley, 14 gm. = 100 per cent), and results recorded in gms. per 100 c.c.

The red blood cell count was done on a Thoma scale. Hayem's solution has been used for purposes of dilution.

Reticulocyte count was done in the usual way by staining with brilliant cresyl blue (0·3 per cent). The percentage figures from 500 red cells were taken.

Icteric index of 5 newborn infants was examined on the 1st, 2nd, 3rd, 5th and 7th day. About 1 c.c. of blood was collected, out of which 0·2 to 0·25 c.c. of serum could be obtained. The serum was matched against a freshly prepared solution of potassium dichromate (1 in 10,000).

## Results

### Hæmoglobin at Birth:

The average hæmoglobin of cord blood was 14·43 gm. per 100 c.c. with S.D. 2·190 and S.E. 0·457. The range of values was from 11·1 gm. to 19·6 gm. The range of variation of 14 gm. to 16 gm. was noted in 10 cases. The average hæmoglobin of heel blood at birth was 15·52 gm. per 100 c.c. with S.D. 0·964 and S.E. 0·180, the range of values being 14·4 gm. to 18·8 gm. The range of variation of 15 gm. to 17 gm. was noted in 16 cases of peripheral blood of the newborn; 18·8 gm. was noted only in one case.

The peripheral blood usually showed higher hæmoglobin value than cord blood. The cord was clamped after the pulsation of umbilical vessels ceased. The difference between cord blood hæmoglobin and infants blood hæmoglobin varied from 3 to 3·9 gm. In two cases, cord blood showed greater hæmoglobin value than heel blood and in both of these cases, the time required for cessation of pulsation was 15 minutes.

### Red Blood Cell Count at Birth:

The average cord blood showed a red cell count of 5·43 million with S.D. 0·197 and S.E. 0·166. The average red blood cell count of heel blood was 6·52 million with S.D. 0·219 and S.E. 0·046. The range of variation of R.B.C. of cord blood was 3·6 million to 6·4 million. The range of variation from 4 million to 6 million was noted in 18 cases. The range of variation of R.B.C. of peripheral blood was from 5·2 to 6·8 million. The range of variation from 6 to 6·8 million was noted in 17 cases. The difference of the red cell count between the cord and the heel blood varied from 0·2 million to 2·2 million per cubic millimeter. The maximum difference was 2·2 million noted in two cases.

Table 1—Showing Comparative Values of Hæmoglobin and RBC and Reticulocyte of Cord Blood and Blood Obtained from Heel of Baby at Birth

| | *Hb. in gms. per 100 c.c.* | | *RBC in millions per cent* | | *Reticulocyte per cent* | |
|---|---|---|---|---|---|---|
| | *Cord* | *Baby at birth* | *Cord* | *Baby at birth* | *Cord* | *Baby at birth* |
| 1159 | 14·3 | 15·1 | 5·6 | 6·5 | 0·96 | |
| 1166 | 12·0 | 15·1 | 4·2 | 6·4 | 1·00 | 1·22 |
| 1169 | 12·2 | 15·1 | 3·6 | 6·6 | 1·44 | 1·09 |
| 1167 | 13·6 | 14·9 | 4·6 | 6·6 | 0·74 | |
| 1170 | 17·4 | 15·7 | 6·5 | 6·8 | 1·35 | |
| 1171 | 19·6 | 14·8 | 6·3 | 6·4 | 0·97 | |
| 1169A | 11·2 | 15·1 | 5·6 | 6·8 | 0·71 | 1·18 |
| 1202 | 14·8 | 15·1 | 6·2 | 6·6 | 0·94 | 1·18 |
| 1345 | 14·3 | 16·5 | 5·8 | 6·8 | 1·03 | 1·12 |
| 1344 | 14·9 | 16·2 | 6·2 | 6·6 | 1·00 | 1·82 |
| 1356 | 17·6 | 17·6 | 5·8 | 6·6 | 1·69 | 1·82 |
| 1349 | 12·6 | ... | 5·5 | ... | 1·14 | |
| ... | 15·8 | 16·5 | 5·8 | 6·8 | 0·55 | 2·06 |
| 1144 | 15·4 | 15·7 | 5·2 | 6·6 | 0·54 | 1·82 |
| 1148 | 14·6 | 15·7 | 5·8 | 6·5 | 0·59 | |
| 1154 | 14·0 | 15·4 | 5·0 | 6·4 | 0·56 | 1·46 |
| 1152 | 15·1 | 15·6 | 6·4 | 6·5 | 0·63 | 1·43 |
| 1155 | 11·1 | 15·6 | 4·6 | 6·6 | 0·56 | |
| 1147 | 12·5 | 15·3 | 5·4 | 6·6 | 0·93 | |
| 1157 | 14·3 | 14·0 | 5·4 | 6·4 | 0·52 | 1·28 |
| 1161 | 16·5 | 17·4 | 6·2 | 6·5 | 0·45 | 1·29 |
| 1160 | 16·5 | 15·5 | 5·4 | 6·4 | ... | 1·03 |
| 1165 | 11·9 | 14·8 | 3·8 | 6·2 | ... | 1·03 |
| 162 | 13·7 | 14·4 | 5·2 | ... | ... | ... |
| 166 | 14·1 | ... | 5·4 | 5·8 | ... | ... |
| 165 | 14·0 | ... | 5·0 | ... | ... | ... |
| Average | 14·43 | 15·52 | 5·43 | 6·52 | 0·88 | 1·42 |
| S.E. | 0·457 | 0·180 | 0·166 | 0·046 | 0·076 | 0·089 |
| S.D. | 2·190 | 0·864 | 0·797 | 0·219 | 0·365 | 0·332 |

### Reticulocyte Count at Birth:

The average reticulocyte of cord blood was 0·88 per cent with S.D. 0·365 and S.E. 0·076. The average reticulocyte of heel blood at birth was 1·42 per cent with S.D. 0·332 and S.E. 0·089. The reticulocyte count of cord blood varied from 0·36 per cent to 1·69 per cent.

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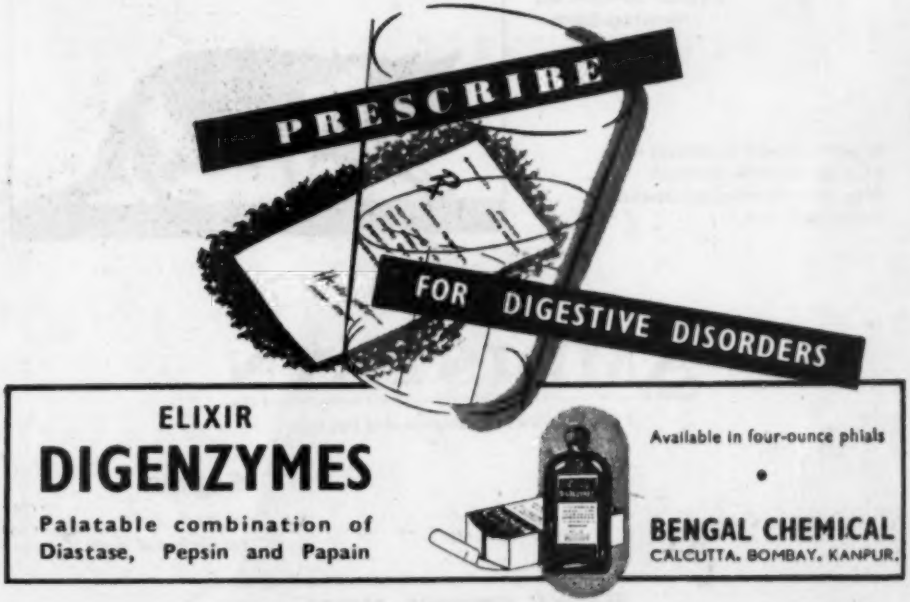
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TABLE 2—SHOWING VALUES OF HÆMOGLOBIN, R.B.C. AND RETICULOCYTES OF NEWBORN INFANT'S BLOOD AT BIRTH AND ON SUBSEQUENT DAYS (UP TO 7TH DAY)

| | *Hæmoglobin in gms. per 100 c.c.* | | | | | | | *R.B.C. in millions per cent* | | | | | | | *Reticulocytes per cent* | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *1st* | *2nd* | *3rd* | *4th* | *5th* | *6th* | *7th* | *1st* | *2nd* | *3rd* | *4th* | *5th* | *6th* | *7th* | *1st* | *2nd* | *3rd* | *4th* | *5th* | *6th* | *7th* |
| 1159 | 15·1 | | 14·6 | | 15·1 | | 15·0 | 6·5 | | 6·4 | | 6·5 | | 6·4 | | | | | | | |
| 1166 | 15·1 | | 14·8 | | 14·8 | | 14·6 | 6·4 | | 6·2 | | 6·2 | | 6·2 | 1·22 | 1·29 | 1·29 | | 1·42 | | 1·40 |
| 1169 | 15·1 | | 14·8 | | 14·6 | | 14·6 | 6·6 | | 6·4 | | 6·3 | | 6·2 | 1·09 | | 1·25 | | 1·30 | | |
| 1167 | 14·9 | | 14·4 | | 14·3 | | | 6·6 | | 6·4 | | 6·3 | | | | | | | | | |
| 1170 | 15·7 | | 15·4 | | 14·8 | | 14·3 | 6·8 | | 6·6 | | 6 4 | | 6·6 | | | | | | | |
| 1171 | 14·8 | | 14·7 | | 14·6 | | | 6·4 | | 6·4 | | 6·3 | | | | | | | | | |
| 1169A | 15·1 | | 14·6 | | 14·8 | | | 6·8 | | 6·6 | | 6·6 | | | 1·18 | | 1·27 | | 1·36 | | |
| 1202 | 15·1 | | 15·1 | | 14·8 | | | 6·6 | | 6·6 | | 6·4 | | | 1·18 | | 1·21 | | 1·34 | | |
| 1345 | 16·5 | | 15·0 | 16·0 | | 15·7 | | 6·8 | | 6·6 | 6·6 | | 6·5 | | 1·12 | | | 1·21 | | 1·32 | |
| 1344 | 16·2 | | | 15·7 | | 15·4 | | 6·6 | | | 6·4 | | 6·4 | | 1·82 | | | 1·97 | | 2·00 | |
| 1356 | 17·6 | | 17·4 | | 17·1 | | 17·0 | 6·6 | | 6·5 | | 6·4 | | 6·6 | 1·82 | | 1·91 | | 2·03 | | |
| 1349 | | 16·5 | | 16·2 | | 16·1 | | | 6·6 | | 6·5 | | 6·4 | | | 1·45 | | 1·54 | | 1·69 | |
| ... | 16·5 | | 16·2 | | 15·7 | | 15·5 | 6·8 | | 6·7 | | 6·6 | | 6·6 | 2·06 | | 2·15 | | 2·27 | | |
| 1144 | 15·7 | | | 15·4 | | 15·1 | | 6·6 | | | 6·2 | | 6·2 | | 1·82 | | | 2·03 | | 2·02 | |
| 1148 | 15·7 | | 15·4 | 15·2 | | 15·0 | | 6·5 | | 6·4 | 6·4 | | 6·4 | | | | | | | | |
| 1154 | 15·4 | | 15·1 | | 15·0 | | 14·8 | 6·4 | | 6·0 | | 6·1 | | 6·0 | 1·46 | | 1·81 | 19·2 | | 1·92 | |
| 1152 | 15·6 | | 15·5 | | 15·3 | | 15·0 | 6·5 | | 6·4 | | 6·4 | | 6·4 | | | | | | | |
| 1155 | 15·6 | | 15·4 | | 15·4 | | 15·2 | 6·6 | | 6·8 | | 6·3 | | 6·3 | | | | | | | |
| 1147 | 15·3 | | 15·0 | | | | | 6·6 | | 6·5 | | | | | | | | | | | |
| 1157 | 14·0 | | 13·9 | | 13·9 | | 13·8 | 6·4 | | 6·3 | | 6·2 | | 6·2 | 1·28 | | 1·33 | | 1·42 | | |
| 1161 | 17·4 | | 16·9 | | 16·8 | | 16·6 | 6·5 | | 6·4 | | 6·3 | | 6·4 | 1·29 | | 1·38 | | 1·43 | | |
| 1160 | 15·5 | | 15·2 | | | | 15·0 | 6·4 | | 6·4 | | | | 6·3 | | | | | | | |
| 1165 | 14·8 | | 14·8 | | | | | 6·2 | | | 6·5 | | | | | | | | | | |
| 162 | 14·4 | | | 13·7 | | 13·6 | | 5·8 | | | 5·6 | | 5·4 | | | 1·24 | | | | | |
| 166 | | 16·0 | | 15·4 | | 15·2 | | | 6·5 | | 6·3 | | 6·2 | | | 1·24 | | | | | |
| 165 | | 15·6 | | 15·0 | | 14·8 | | | 6·6 | | 6·3 | | 6·3 | | | | | | | | |
| Average | 15·52 | | 15·27 | | 15·20 | 15·12 | | 6·52 | | 6·46 | | 6·33 | | 6·30 | 1·42 | | 1·54 | 1·61 | | 1·65 | |
| SE | 0·181 | | 0·186 | | 0·170 | 0·183 | | 0·046 | | 0·039 | | 0·043 | | 0·59 | 0·089 | | 0·106 | 0·091 | | 0·104 | |
| SD | 0·864 | | 0·836 | | 0·816 | 0·820 | | 0·219 | | 0·176 | | 0·203 | | 0·264 | 0·332 | | 0·336 | 0·352 | | 0·313 | |

| | Hæmoglobin gm./100 c.c. | | | | Red blood cells in millions | | | | Reticulocytes percentage | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Mean | SD | SE | No. | Mean | SD | SE | No. | Mean | SD | SE |
| 1st day | 23 | 15·52 | 0·864 | 0·180 | 23 | 6·52 | 0·219 | 0·46 | 14 | 1·42 | 0·332 | 0·089 |
| 3rd day | 20 | 15·27 | 0·831 | 0·86 | 20 | 6·46 | 0·176 | 0·39 | 10 | 1·54 | 0·336 | 0·106 |
| 4th-5th day | 23 | 15·20 | 0·816 | 0·170 | 23 | 6·33 | 0·218 | 0·43 | 15 | 1·61 | 0·362 | 0·041 |
| 6-7th day | 20 | 15·12 | 0·8 | 0·183 | 20 | 6·30 | 0·264 | 0·059 | 9 | 1·65 | 0·313 | 0·104 |

8 samples showed a range of variation of reticulocyte from 1 per cent to 1·69 per cent and 19 showed variation between 0·5 per cent and 1·5 per cent. The variations in heel blood reticulocyte ranged from 1·03 per cent to 2·06 per cent. Out of 14 cases, 13 showed range of variation from 1·03 per cent to 2 per cent and one showed 2·06 per cent.

OBSERVATIONS IN EARLY NEONATAL LIFE:

The heel blood was examined on 3rd, 4th and 5th day, 6th and 7th day. Three cases were examined again on 2nd day as the sample on the 1st day was spoiled. For obvious reasons, every one of the cases could not be followed up to 7th day and so that 6th and 7th day figures and 4th and 5th day figures were taken together in many cases. On the 3rd day, 20 cases were examined, on the 4th and 5th day 23 cases were examined and on the 6th and 7th day, 20 cases were examined. There was progressive fall of both hæmoglobin and red blood cells from the date of birth to 6th and 7th day. The total fall of hæmoglobin from birth to 6th and 7th day was 0·42 gm. or 2·7 per cent of the total value.

The maximum depreciation in hæmoglobin occurred between birth and 3rd day in case of hæmoglobin and 4th day in case of red blood cells. The rate of decline from 3rd day to 7th day was not as rapid as in the first 48 hours. The total fall of R.B.C. from birth to 6th and 7th day was 2·2 million.

RETICULOCYTE:

There was gradual increase of reticulocytes from the date of birth to 6th and 7th day. The total increase on the 6th and 7th day was by 0·23 per cent. The increase was progressive and did not reveal any stationary attitude.

ICTERIC INDEX:

Icteric index in early neonatal life does not reveal any striking difference on the different day figures. The icteric index on the 1st day was higher than on subsequent days. There was rather gradual diminution of icteric index.

ICTERIC INDEX

| Sr. No. | 1st day | 2nd day | 3rd day | 4th day | 5th day | 6th day | 7th day |
|---|---|---|---|---|---|---|---|
| 1 | | 8 | | 8 | | 6 | |
| 2 | 10 | | 8 | | 8 | | 6 |
| 3 | 8 | | 8 | | 6 | | 6 |
| 4 | 12 | 10 | | 8 | | 5 | |
| 5 | 10 | | 8 | | 8 | | 6 |

DISCUSSION

The cord blood and the blood obtained from heel of the newborn were examined simultaneously. It has been revealed that the averages of both hæmoglobin and R.B.C. (15·52 gm. and 6·52 million, respectively), were higher than those of the cord blood (14·43 gm. and 5·43 million). Explanation of this has been offered by different observers. Whether this increase is due to different sources of blood (namely venous blood of cord and peripheral blood in the newborn) is a moot question. The splenic contraction throwing greater amount into circulation and occlusion of capillaries by large mononuclear cells have been offered as explanations (Taylor, quoted by Barcroft, 1938). Polycythæmia in the newborn has been observed in this series. Relative low oxygen tension and different hæmoglobin characters are the possible explanations. Mukherjee (*loc. cit.*) found that any condition interfering with normal aeration of placental blood caused an increase in initial polycythæmia at birth with concomitant reflection on hæmoglobin values and cell volume findings. For example asphyxiated babies show greater hæmoglobin and R.B.C. values than normal babies. The average reticulocyte count of the infant at birth was higher than that of the cord blood. This suggests a higher level of activity of hæmopoietic system in the fœtus at birth.

The early neonatal blood picture reveals gradual decrease of red blood cell count and hæmoglobin count. Side by side with it, there is an upward curve of the reticulocyte level and this phenomenon suggests that the erythropoietic activity of the newborn is continuing. With regard to the hæmoglobin and red blood cell, the depreciation curve was rapid up to 3rd day in case of hæmoglobin and 4th and 5th day in case of R.B.C. This mechanism is probably compensatory with the establishment of pulmonary respiration. From 3rd day, the decline is not so rapid and this can be explained as due to dehydration effect consequent on water loss by the newborn. The total fall of R.B.C. from birth to 6th and 7th day was 0·22 million or 3·3 per cent of total value.

Jaundice was not observed in this series either clinically or by the icteric index. In fact, icteric index in this small series was found to become less each day after birth. This may be explained as follows—

(*i*) There is no destruction of red blood cells other than the physiological destruction.

(*ii*) There is no decreased excretion.

(*iii*) There is normal utilisation and storage of broken down iron pigment in liver and other tissues.

Jaundice that has been observed in the case of the newborn infant in the process of this enquiry has been only in premature babies. Mackay (1933b) found greater destruction of red blood cells in premature babies. Mukherjee (*loc. cit.*) found more imperfectly hæmoglobinised cells and more nucleated cells in case of premature babies.

### Summary and Conclusion

1. Hæmoglobin content, red blood cell count and reticulocyte percentage is higher in the newborn at birth than the cord blood. Several explanations have been offered.

2. The hæmoglobin content of infant at birth is 15·52 gms. – 0·180 compared with that of cord blood 14·43 gm. – 0·457.

The R.B.C. of infant at birth is 6·52 million – 0·046 compared with that of cord blood which is 5·43 million,—0·166.

The reticulocyte count of infant at birth is 1·42 – 0·089 compared with that of cord blood which is 0·88 – 0·076.

3. There is progressive decrease in hæmoglobin content and R.B.C. count in early neonatal life.

4. No jaundice has been noticed either clinically or by increased icteric index at birth or in early neonatal life. Icteric index at birth is higher than in subsequent days.

5. The reticulocyte percentage is increased after birth, suggesting mild erythropoietic activity side by side with physiological destruction of red blood cells.

### Acknowledgment

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## *CRITICAL SUMMARIES FROM U.S.A.*

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I

## THE CLINICAL USE OF RADIOACTIVE IODINE IN THYROID DISEASE

STEPHEN BENNETT YOHALEM, M.D.

The introduction of radioactive isotopes has provided the physician with an extraordinarily useful tool. Radioactive iodine is a particularly apt illustration of the diagnostic and therapeutic function of the radioisotope.

### I. Basic Principles

*Metabolism of Iodine*—The element iodine ingested as such or as iodide is rapidly absorbed from the stomach. Inorganic iodide entering the blood stream in this fashion is then removed in two ways: the thyroid gland efficiently concentrates the element, and the kidney excretes it. This ability of the gland to concentrate the element is remarkable and exceeds that of any other organ by 1,500 times. In pharmacologic doses the kidney of the normal human excretes the remainder within twenty-four hours. It is evident then that in ordinary amounts no significant iodide accumulates in any organ of the body other than the thyroid. When the gland is saturated, naturally all iodine ingested is excreted.

Iodine collected by the thyroid is oxidised and incorporated in organic molecules such as diiodotyrosine and finally synthesized into thyroxin, the thyroid hormone. This small molecule is bound to both globulins and albumins and then either stored as colloid in the gland or secreted as hormone into the blood stream. The exact fate of released hormone is unknown, but a great proportion of the iodine is degraded to iodide and recollected by the thyroid for further synthesis. Normally the blood inorganic iodine is a very small portion of the whole blood iodine. The greater part is protein bound iodine, which is essentially thyroid hormone.

The fate of ingested iodine depends on a number of factors. First is the saturation of the thyroid by iodine. Saturation results in almost complete excretion of all ingested iodine. Secondly, when the thyroid is not fully saturated with iodine, the proportion of an ingested pharmacologic dose which is taken up by the gland is roughly proportional to the functional activity of the gland. Thus hyperthyroid individuals usually take up more than 50 per cent of an ingested dose while hypothyroids accept less than 5 per cent. Both thiocyanate and the antithyroid thioureas block this uptake of iodine. Similarly, the rate of release of hormone from the thyroid gland reflects its functional state: the more active the gland, the greater the rate of hormone release and the greater the level of circulating hormone (and its protein bound iodine).

*Isotopes*—Isotopes are forms of an element of a given atomic number with varying atomic weights. Since the atomic number defines the number of circulating electrons it determines the chemical reactions of the element. There are no physiologic mechanisms which distinguish isotopes of a given element and it follows that each isotope is handled in the same way metabolically. However, the variation in atomic weight is accompanied by variation in other physical properties including stability. Unstable isotopes decay with the emission of a characteristic radiation. These are commonly referred to as radioisotopes. The rate of decay is expressed as "half life"—that time in which 50 per cent of the element decays. Dosage is expressed in millicuries (mc) which is the radiation produced by 1 mgm. of radium. One microcurie ($\mu$c) equals 1/1000 of a millicurie (mc).

There are certain basic requirements for the clinical usefulness of a systematically administered radioactive isotopes; high concentration in the target tissue, energy which limits the effect of the radiation substantially to the tissue containing the isotope, a sufficiently short life so that continued radiation does not occur, a sufficient stability so that standardization and storage are practicable, and degradation to a physiologically innocuous substance.

The radioactive isotope of iodine generally in use is $I_{131}$. It is produced by neutron bombardment of telurium in the uranium pile or as a byproduct of uranium fission. The half life is eight days, and the degradation product is the inert gas xenon. Radioiodine is administered as a solution of potassium iodide without added inert material. It emits both beta and gamma rays. The therapeutic effect is 90 per cent due to the beta rays. Their energy is such that the effects of the ionizing radiation travel a maximum distance of 1·8 mm. in tissue, 50 per cent being expended within 0·2 mm. On the other hand, the gamma rays are the important factor in diagnosis since, because of their penetration, they may be measured externally by means of a Geiger counter.

It may be seen that $I_{131}$ is ideal from a clinical point of view. It is concentrated in a single organ and the energies of its beta rays are essentially dissipated within that organ. There are no radiation effects on trachea, skin, or even parathyroid tissue. The patient receives radiation for a matter of weeks and the unused portion is excreted too rapidly to affect the excretory organs. Indeed $I_{131}$ is unique in its clinical suitability.

## II. Diagnostic Use

*Hyperthyroidism*—It has been stated that the three basic facts in the utilization of iodine by the body are that the more active the gland the greater the uptake of ingested iodine, the less the loss of iodine in the urine, and the greater the release of organic iodine as thyroid hormone by the gland after synthesis from absorbed inorganic iodine. Each of these facts may be used as the basis of tests of thyroid function.

The simplest and oldest diagnostic test is based on the urinary excretion of iodine. In general within twenty-four hours of ingestion of a tracer dose of radioiodine, usually 25-100 microcuries ($\mu$c), a hyperthyroid patient will excrete less than 20 per cent. A euthyroid (normal) patient excretes 30-80 per cent, and a hypothyroid patient 70-95 per cent. The tracer dose is without measurable effect on thyroid function. Not only the ambiguous zone of 20-30 per cent, but the difficulties of complete urinary collection and the not infrequent occurrence of renal insufficiency in thyrocardiacs with heart failure make the method of limited value. It is little used at present.

Of equal simplicity is the direct measurement of thyroid uptake by means of external measurement of the gamma activity over the thyroid using a Geiger counter or a scintillation counter. This measurement too is customarily made in twenty-four hours. A hyperthyroid patient usually shows an uptake of at least 50 per cent of the tracer dose while euthyroid patients fall below this figure. There is an overlap in the values obtained in the two types of patients so that although a high uptake is almost always diagnostic, figures below the value of 50 per cent need not exclude hyperfunction. In order to obviate variations due to differences in gland size and location with respect to the skin surface, ingenious arrangements of multiple tubes have been devised. The increased sensitivity of the new scintillation counters employing a crystal which fluoresces when exposed to ionizing radiation should eliminate those variations which are due to differences in geometry.

Far superior to either of these methods is the one based on the rate of release of thyroid hormone from the gland. It is after all this property of the hyperthyroid gland which produces the clinical picture of hyperthyroidism. In Fig. 1 are summarized the findings in the blood of three types of patients after ingestion of a tracer dose of radioiodine. When radioiodine is fed to a normal patient there is a sharp rise in radioactivity within a matter of minutes and reach-

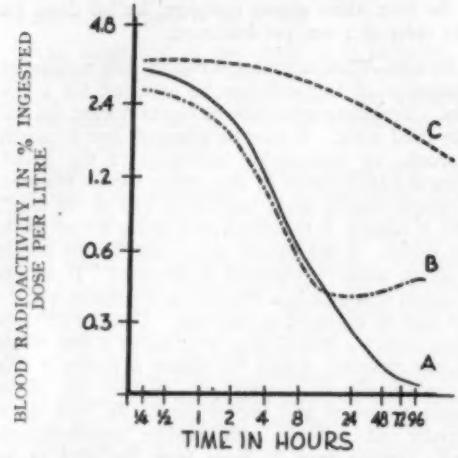


FIG. 1—SHOWING RADIOACTIVITY OF PLASMA MEASURED AFTER ORAL ADMINISTRATION OF TRACER DOSE OF $I_{131}$

A—Euthyroid (Normal) Patients. B—Hyperthyroid Patients. C—Euthyroid (Normal) Patients with Renal Insufficiency.

ing a peak in a few hours. After this the blood level falls off sharply. This fall is due to loss from the blood to the thyroid gland and to the urine. When a hyperthyroid patient receives radioiodine the initial stages of the blood curve are similar to those observed in the normal. However in eight to twelve hours the radioiodine taken up by the thyroid and incorporated in the thyroid hormone begins to be resecreted into the blood. The rate of this production is such that the blood radioactivity rise is significant after the second day. Blood drawn from 72-96 hours after the ingestion of tracer may be analysed with a suitable counter, either an immersion-type (Q gas counter) or better yet a scintillation counter in which the test tube containing plasma is inserted in a hole drilled in the crystal. The method requires only 4 cc. of plasma. It is clear from the third curve that in a patient with renal failure of whatever cause, the blood radioactivity will be high because of failure to excrete organic radioactive iodide. To separate the hyperthyroid patients from those with renal failure it is necessary in all cases with high levels of activity to precipitate the plasma protein with trichloracetic acid, wash three times in a centrifuge, redissolve the protein in alkali and again measure the radioactivity. When the radicactivity remains, i.e., is protein bound, it is due to thyroid hormone and if high indicates hyperthyroidism. Even in total renal failure the excess iodide is not incorporated in the protein bound fraction after weeks of circulation. In an experience of some thousands of determinations we have not seen a euthyroid patient with a protein bound level of radioactivity greater than 0·3 per cent of the ingested dose per liter of blood. No untreated hyperthyroid patient falls below this figure if iodide consumption, gall bladder dye, lipiodol and antithyroid drugs have been excluded. The response of the gland is of course conditioned by antithyroid drugs. In general the effects of inorganic iodide are exhausted within two weeks, and those of the thioureas in three weeks unless clinical remission is maintained. While organic iodides such as priodax interfere with standard determinations of protein bound iodine for months they probably do not affect protein bound radioiodine measurements for more than a few days.

Other suggested uses of blood measurement have included estimations of iodine clearance by the gland or of the conversion ratio of iodide to organic iodine. Since these require either normal kidney function or determinations of excretion and gland uptake as well as blood levels, they appear to be unduly complicated without providing any increase in accuracy.

It is clear that in the overt case of hyperthyroidism these methods are not necessary. The classical determination of the basal metabolism is satisfactory. The use of protein bound iodine determination is superior to the basal metabolic rate but requires special laboratory facilities and arduous technical training. *The great usefulness of the test with radioiodine* lies in that important group of cases where the diagnosis is not clear cut, those with marked disease manifested primarily as heart disease, and those in whom a severe anxiety state makes metabolic measurements impractical while provoking a clinical picture similar to and frequently indistinguishable from true hyperthyroidism.

*Other thyroid states*—It had been hoped that radioiodine would contribute to the diagnosis of thyroid cancer. It is true that with a collimated Geiger counter one may measure fractionally the uptake of each portion of a palpable goiter. It is likewise true that in general carcinomatous tissue functions less efficiently with respect to iodine than does normal thyroid tissue. However, this is also true of inflammatory tissue and of resting colloid. Therefore, only a statement as to relative function can be made with such a counter, and the diagnosis of malignancy should always be based on biopsy study. All solitary masses or nodules should be examined by excision and microscopic study.

Studies with a collimated counter may be used to determine the nature of metastatic tissue in lymph nodes, bone or lung. Only a positive report is of value since failure of a tumor to take up radioiodine does not preclude a thyroid origin. The method is particularly useful in identifying superior mediastinal goiters.

In hyperthyroidism caused by ingestion of thyroid extract there is no uptake of radioiodine, and this is diagnostic—if thyroiditis can be excluded clinically—, for in the latter disease there is also an elevation of the blood protein bound iodine.

Radioiodine has not proved useful in the diagnosis of thyroid underactivity although it may be used in infants to determine the complete absence of thyroid tissue, as in juvenile myxœdema.

In summary, radioiodine has provided a most potent tool for accurate diagnosis of hyperthyroidism and has a limited usefulness in other abnormal thyroid conditions.

The simplest and most accurate method is that which measures the level of release of radioactive hormone to the blood.

### III. Therapeutic Use

The treatment of hyperthyroidism with internal radiation with radioiodine is based on the fact that the hyperthyroid tissue collects the isotope and the fact that cells exposed to the ionizing radiation are destroyed. Treatment consists in oral administration of a tasteless solution of radioactive potassium iodide in water. Hospitalization is not required.

*Dosimetry*—The clinical response to radioiodine depends on the amount of radiation delivered to a unit weight of thyroid tissue and on the radiosensitivity of this tissue. Fortunately, the latter factor is apparently fairly constant. The amount of radiation depends in turn on the dose administered, the percentage of the administered dose retained, the size of the gland, and the biological half life. Of these variables the first two may be determined conveniently and accurately. Since the biological half life is six and one half days the potential error in the direction of over-dosage is slight, using an element with a physical half life of eight days. The size of the gland is estimated by physical examination and requires clinical practice.

A dose calculated to deliver 80 $\mu$c of $I_{131}$ to the gland per gram of tissue gives about ten thousand equivalent roentgens and is the dose required by the average patient. Estimating the uptake directly or by excretion, this has required 3-12 mc. in the average patient with a mean of 8·2 mc. in our experience. The dose required may be given at eight week intervals. The younger the patient, the more advisable is the course of split dosage, giving about 80 per cent at the first treatment. This method lessens the incidence of post-therapeutic hypothyroidism. On the other hand, where the heart is seriously affected as in almost all older patients, this prolongation of treatment is inadvisable and full dosage must be employed. Where the goiter is substernal, dosage is a matter of intelligent guess-work and one must weigh the risks of hypothyroidism *versus* prolonged treatment in each patient.

To summarize, a patient with an 80 per cent uptake of $I_{131}$ and a gland estimated at 50 grams would require 5 mc. of $I_{131}$. If young, this would be given as 4 mc. initially, with further treatment as required; while if older, the initial dose would be 5 mc. Where clinical improvement is slight, the second dose is about half the first; where almost complete, further doses are of the order of 1 mc. per treatment.

*Results*—When a patient is treated with radioiodine no response of any sort can be expected for a few weeks. Subjective improvement begins toward the end of the third week. It may be preceded, but is usually succeeded, by measurable shrinkage of the gland. Objective improvement in the pulse, blood pressure, and weight usually begin toward the end of the fourth week; it reaches a maximum and levels off in six to eight weeks. If the patient is not well by the end of the eighth week, retreatment is indicated. If no improvement whatever has occurred in six weeks, retreatment may be instituted at this time. Under no circumstances should a second dose ever follow a first within a shorter interval. Where the disease is severe, it may be undesirable to permit an interval to elapse between treatment and improvement. In such cases, especially all patients with cardiac manifestations, Lugol's solution may be given from the third to the twenty-fourth day after radioiodine. This will produce temporary iodine remission without affecting evaluation of the radiation effect after the eight week period. Patients who are apparently well six weeks after treatment may again be mildly toxic ten to twelve weeks after $I_{131}$ has been given. Similarly, patients who are mildly hypothyroid after six to eight weeks are frequently normal at ten to twelve months.

In general, cardiac patients have responded particularly well, even in the presence of rheumatic heart disease. Where auricular fibrillation is present, spontaneous regularization occurs in about 75 per cent of patients, and after quinidine in an additional 15 per cent. Where essential hypertension has been present, cure of the hyperthyroidism has had no beneficial effect on the blood pressure, although impaired cardiac function may improve. Indeed, the diastolic pressure frequently rises after treatment. Measurable recession of exophthalmos is rare, although with the loss of stare it becomes less apparent. On the other hand, post-therapeutic exophthalmos is also rare, occurring in about 0·1 per cent of patients.

Seventy-five per cent are cured with a single dose, and 95 per cent with two. The final rate of cure is roughly 100 per cent.

*Complications*—Neither exacerbation of hyperthyroidism nor increase of local pressure symptoms following therapy have occurred. In very rare cases a transient mild thyroiditis consisting of mild tenderness lasting one week has been present on the second or the third day. There is no evidence of injury to the genitourinary or hematopoietic systems. In female patients the menstrual cycle, if undisturbed by the primary disease, has not been adversely affected by the treatment. Many patients have become pregnant after therapy, and these pregnancies are in no way remarkable. There has been no detectable damage to the laryngeal nerves or to the parathyroid glands.

The overall incidence of post-therapeutic hypothyroidism is close to 5 per cent, a figure similar to the results with surgery in the U.S.A.

In about half of the cases it is transient. The incidence of relapses is less than 1 per cent, which is superior to the usual surgical result and infinitely so to the results with thioureas. Hospitalization of the patient is not required.

*Indications and Contraindications*—The results obtained with radioiodine are so uniformly excellent that it must be explained why it is not now the sole recommended form of treatment. In diffuse toxic goiter where the incidence of malignancy is negligible, there is no serious contraindication to the use of internal radiation except pregnancy. Since iodine passes the placental barrier and is concentrated by the fœtal thyroid as well as the maternal, it is clearly impossible to use the method without destroying the fœtal thyroid. Experiments with therapeutic abortions show that this is true early in pregnancy, even before a local thyroid is detectable as such. Pregnancy, then, is an absolute contraindication.

The problem with the nodular goiter is different. While no two observers agree on the actual incidence of carcinoma in solitary nodular goiter, there is general agreement that it is insignificant. Although toxicity is associated with a lower incidence of malignancy, the combination does occur. There is no great problem in curing hyperthyroidism of the toxic adenoma with radioiodine, although some observers have found that a larger dose is required than in diffuse goiter. However, in such patients one has no assurance that a carcinoma has not been missed. This reasoning applies with equal force to medical thyroidectomy with a thiourea. Unquestionably these patients should be treated surgically if operable. Radioiodine is not a suitable drug for preoperative preparation, since a patient in remission due to radioiodine is almost sure to be hypothyroid after surgery. On the other hand, where the goiter is multinodular the risk of malignancy is considerably less, and radioiodine may be used as in diffuse goiter. The theoretical possibility of late induced carcinoma due to radiation has been a drawback to universal acceptance of the method, but the facts so far do not bear out this misgiving. There is no analogy with radium, because continuous radiation does not occur. For all practical purposes the radiation has ceased after thirty-six days. Early attempts at treating hyperthyroidism with external radiation met with but moderate success because of the limitations of dosage. In the group of patients so treated and in those receiving radiation of laryngeal tumours or lymphomas, no induced thyroid carcinoma has ever been reported. Similarly, among the many thousands of patients treated with internal radiation in the past eleven years, no such unfortunate accident has occurred. It obviously cannot be stated with certainty that it cannot occur in another ten years. For this reason many workers prefer to restrict internal radiation to the age group over forty or, in extreme cases, forty-five; in other words, to the patients with the shorter life expectancy. This has the added logic that it is also the age group with the higher surgical mortality. On the basis of the evidence so far, it would seem that the risk of induced malignancy is lower than the surgical mortality in even the better hospital centers.

In Table 1 are summarized the salient differences between isotope therapy and the alternatives in popular use. Our experience with the method now comprises more than 1,000 cases with only two treatment failures. Although there is no factual estimate of the total number of patients treated in the U.S.A., isotope clinics have multiplied rapidly in the past five years and published reports from other clinics show a general agreement with the results outlined. Because of the low morbidity, high rate of cure, absent mortality, low rate of relapse, and general simplicity for ambulatory patients, internal radiation with radioiodine is the treatment of choice for most diffuse toxic goiters and the majority of multinodular toxic goiters.

TABLE 1

| *Factor* | *Surgery* | *Thiouracils* | $I_{131}$ |
|---|---|---|---|
| Time for control | 3-4 weeks | 4-10 weeks | 6-16 weeks |
| Hospitalization | Yes | No | No |
| Relief of pressure | Yes | No | Yes |
| Cosmetic result | Good with scar | Poor | Good |
| Mortality | 0·2-1% | Rare | Rare |
| Toxicity | No | Yes | No |
| Post-therapeutic exophthalmos | Not infrequent | Rare | Most rare |
| Laryngeal paralysis | Yes | No | No |
| Tetany | Yes | No | No |
| Myxœdema and hypothyroidism | 2-29·7% | No | 3-10% |
| Recurrence | 4-12% | 40-60% | Rare |
| Cancer | Best result | Unknown | Unknown |

*Treatment of Cancer*—Internal radiation in carcinoma of the thyroid has not yet effected a cure, nor is it likely to do so. For this reason surgical extirpation should always be attempted. Where distant metastases are present, sufficient uptake to be of therapeutic value will occur in about 15 per cent of patients. Dosage is 100 mc. every two months until no further uptake can be demonstrated, or until damage to the bone marrow precludes further treatment. Each single administration represents a dose about 12 times the size of the total therapeutic dose required for the treatment of hyperthyroidism. Furthermore, since the administration must be repeated in treating carcinoma, the eventual dosage is extremely large. When dealing with doses of this magnitude, unlike the small amounts used in hyperthyroidism, many toxic effects are noted: severe thyroiditis, salivary inflammation, achlorhydria, acute swelling of tumour masses with pressure symptoms, and aplastic anæmia. With larger doses death has occurred due to radiation sickness. Although the results in the occasional case may be gratifying, the picture in the treatment of cancer is not bright.

SUMMARY

Radioiodine provides the most accurate method available for assaying thyroid hyperfunction. It also provides the treatment of choice for the majority of patients suffering from hyperthyroidism with diffuse goiter. Certain less valuable diagnostic and therapeutic results are described for other thyroid affections.

APPENDIX

In the U.S.A. radioactive isotopes are released to hospitals and practitioners under license from the United States Atomic Energy Commission. The minimum personnel requirements are a physicist to supervise physical measurements and safety procedures and a physician trained in the clinical application of isotopes. This training is available in classes run by the commission and by apprenticeship in approved functioning laboratories.

The minimal physical apparatus necessary includes a scaling circuit, a Geiger-Muller counter preferably of the bismuth wall gamma counting type, a scintillation crystal of thallium actived sodium iodide and photo tube, storage facilities with lead bricks, long tongs and remote control pipettes, film badges and pocket ionization survey meter. Their total cost at present is about $3500.

Since atomic piles are presently operating or under construction in many other countries it is presumed that local controls and methods of allocation will be designated.

Detailed information about United States methods may be obtained from the Isotopes Division, United States Atomic Energy Commission, Oak Ridge, Tennessee, U.S.A.

*PRACTITIONERS' CORNER*

# OBSERVATIONS ON OBSTRUCTED LABOUR

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Obstructed labour means a state where the delivery of the fœtus per via naturales is obstructed, as a result of which the mother is long in labour; there is risk to both the mother and the fœtus unless timely external help is rendered to effect the delivery.

This unfortunate complication of childbirth is responsible for good many cases of maternal and fœtal mortality and morbidity. Apart from immediate death and disability, various ailments both psychological and organic, especially those of the female generative tract follow as an aftermath of obstructed labour.

Majority of these complications can be prevented by proper antenatal care and timely intervention. With these views in mind, some observations about the obstructed labour cases were being recorded.

Thirty-one cases of obstructed labour were personally managed between the years 1945-1950 during the author's stay at the Sanctoria Hospital, Dishergarh, Burdwan, West Bengal. This is a general hospital owned by Messrs. Andrew Yule & Co., Ltd., and caters for the Ranigunj and neighbouring coal fields of Bihar. It is expected that a study of these cases should give a fairly representative idea of this complication as found in the rural areas of West Bengal and adjoining parts of Bihar. Majority of the cases were Santhals and Koles. About a third of these cases came from the Bengali and Bihari population of the area. Of these only 4 belonged to middle class families, and the rest to the poorer labour classes. Tables 1 and 2 have been prepared from histories of five typical cases. A study of the tables will show that all the cases were sent to hospital fairly long after the labour had started. Membranes were ruptured outside in all cases and the fœtus was dead in Case 5 and apparently dead in the first four cases. All cases were interfered outside either with vaginal manipulations or premature exhibition of oxytocics or instrumentation. General condition of the patients 1, 3 and 4 were unsatisfactory at the time of admission.

Table 2 gives the preoperative, operative and postoperative managements of the cases together with the causes of obstruction as observed during examination by the author.

The findings include clinical observations only. No bacteriological or radiological examination was made.

*Condition of the Uterus on admission*—Cases 1, 3 and 4 had tender uterus with retraction ring. The upper uterine segment was contracting, but relaxing incompletely and patients were experiencing pain after disappearance of a palpable contraction. In Case 2, the uterus was distended with foul smelling gas and was atonic.

Details of the cases will be found in Tables 1 and 2.

## DISCUSSION

Causes of obstruction to the birth of the baby are classically divided into

1. Causes in the fœtus
2. Causes in the maternal pelvis
3. Causes in the uterus

Perhaps the commonest cause is an undetected occipitoposterior presentation with or without a contracted maternal pelvis. Malrepresentations of the fœtus as transverse lie, face or brow, complex and breech presentations may also cause obstruction. Disparity between the fœtal head and maternal pelvis may be due to real contraction of the bony pelvis (inlet, midcavity or outlet) or a relatively big head (or hydrocephalus). Management is straightforward in cases of gross pelvic contractions but doubt and difficulty arise in minor degrees of disproportion. Other causes of obstruction may be any space-occupying tumour in

a most efficient treatment for skin disorders

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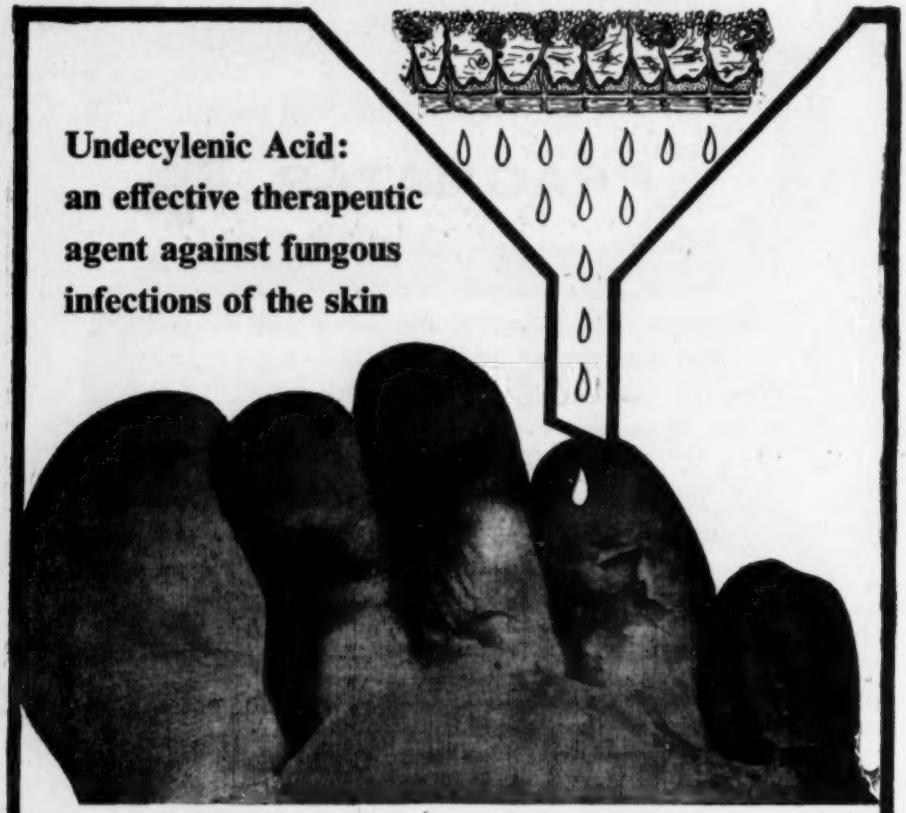

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TABLE I

| *Name* | *Date and time of admission* | *Parity* | *History before labour* | *Length of pregnancy & labour* | *Condition of uterus* | *Membranes* | *Treatment outside* | *Maternal condition* | *Fœtal condition* | *Bladder* | *Remarks* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A.B. | 2 a.m. 24-5-47 | 2nd Para | Œdema of feet; scanty urine | Full term 19 hours | Tender, distended; vigorously contracting; retraction ring, plus | Ruptured 13 hours ago | Enemata—3 times Quinine Sulph 10 gr. by mouth at 2 p.m. and 8 p.m. | Œdema all over including vulva, Boisterous, Pulse—126 p.m. Resp.—30 p.m. B.P.—155/96 mm. Hg. | Fœtal heart sound not audible | Distended up to umbilicus | Cervix fully dilated; head above ischial spines, jammed; œdema of vulva caput, occipito-posterior |
| C.B. | 10 p.m. 6-4-48 | 5th | Nothing suggestive | Full term 10 hours | Tender, distended with foul smelling gas; atonic | Ruptured 8 hours ago | Manipulations outside—failed | Fair; B.P.—130/90 mm, Hg. P/R 100/19 p.m. | F. H. S.—not audible | Distended up to umbilicus | Left hand prolapsee cervix almost fully dilated; shoulders posterior |
| M.M. | 16-7-46 3 a.m. | 3rd | Nothing suggestive | Full term 3 days | Tender, tonically contracted; retraction ring, plus | Ruptured 2 days ago | Failed forceps 12 hours ago. Perineum lacerated, infected | Unsatisfactory T—100°F. P/R—120/24 p.m. B.P.—90/70 mm. of Hg. Lungs—aales all over both lungs | F. H. S.—not audible | Distended | Vulva œdematous; 2nd degree perineal tear; cervix 3 fingers dilated; mento-posterior; jammed; offensive gas coming out of cervix |
| A.K. | 5 p.m. 25-3-47 | 1st | Nothing suggestive | Full term 48 hours | Tender, contracting—relaxing | Ruptured 36 hours ago | Manipulations and repeated vaginal examinations by *dhai* | Unsatisfactory; anæmic. P/R—110/26 per min. B.P.—100/60 mm, Hg. | F. H. S.—not audible | Distended up to umbilicus | Head above ischial spines, impacted; cervix fully dilated, occipito-posterior |
| C.A. | 11 a.m. 11-11-46 | 4th | Nothing suggestive | Full term 8 hours. Breach born two hours ago. Head impacted | Contracting and relaxing | Ruptured | Traction on the trunk;; forceps to after-coming head without anæsthesia | Good. P/R—100/20 B.P.—120/80 mm. of Hg. | Fœtus dead | Not distended | After-coming head impacted; trunk outside vulva; perineum lacerated |

TABLE 2

| Name | Treatment on admission | Time of operative treatment and reason of operation | Premedication & anæsthesia | Nature of operation | Post-operative condition | Post-operative complications | Post-operative treatment | Results: Mother | Results: Baby | Results: Placenta | Cause of obstructed labour |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A.B. | Inj. morphine gr. ¼ I.M. Inj. glucose—25% 100 c.c. I.V. | ½ hour. Uterus ocntracting vigorously—Retraction ring. Mother showing signs of impending eclamptic seizure | Atropine gr. 1/100 I.M. Seconal sodium 2 capsules 3 grs.) Open Ether | Craniotomy | Fair. P.—130 p.m. B.P.—110/70 mm. of Hg. | Blood lost about 1 pint | Penicillin 50,000 units 3-hourly for 5 days Ergometrine—I. M. Sedatives. I.V. glucose 25%. 50 c.c. A.T.S.—1500 units I.V. | Discharged. Uterus involuting well Perineal wound well healed | Dead Wt. 7 lbs. without brain matter | 1 lb. 3 ozs. showed big infarcted areas at places | Big baby, overstimulation of the uterus by quinine |
| C.B. | Inj. morphine gr. ¼ I.M. Inj. glucose—25% 100 c.c. I.V. | 7 hours Transverse lie with prolapsed hand, dead fœtus | Atropine gr. 1/100 I.M. Gas, oxygen & ether by closed circuit | Decapitation | Fair. P.—120 p.m. B.P.—102/60 mm. of Hg. | P.P.H. about 2 pints Placenta removed manually | I.V. saline with 12½% glucose per pint continued by drip method—7 pints. Ergometrine A.T.S. Sulphadiazine 2 tabs a hourly till temp. subsided | Discharged. Uterus involuting well | Dead 8 lbs. 9 ozs. | 2 lbs. | Neglected. Transverse lie |
| M.M. | I.V. saline with 12½% glucose by drip. Coramine 1·7 c.c. 4 hrly. A.G.S. 20,000 units I.M. Sedatives | 5 hours spent in trying resuscitation. Mentoposterior—impacted | Morphine gr. ¼ I.M. Atropine gr. 1/100 I.M. Gas, oxygen & ether | Craniotomy through right orbit | P.—? B.P.—? | Shock. Severe P.P.H. about 2½ pints | I.V. saline continued | Died after ½ hour | Dead | Not removed | Impacted mento-posterior |
| A.K. | I.V. saline with 12½% glucose by drip. Dial 1 amp. | 2 hours. Failure of progress of impacted head through narrow outlet. | Atropine gr. 1/100 I.M. Gas, oxygen & ether | Craniotomy and left cleidotomy | Unsatisfactory P.—140 p.m. B.P.—80/50 mm. Hg. | Severe P.P.H. Shock. Perineal tear stitched | I.V. saline continued, Coramine 1·7 c.c. 4-hourly I.M. Oxygen inhalation at the rate of 60 bubbles p.m. | Died 13 hours after operation | Died 6 lb. 4 ozs. | 1 lb. | Outlet contraction with O.P. |
| C.A. | Premedication | 15 mins. | Atropine gr. 1/100 I.M. Pentothal sodium | Extraction of after-coming head | Good | Nil | Sulphanilamide 2 tabs 4 hourly for 3 hours Alkalis | Discharged | Dead 5 lb. 8 ozs. | 1 lb. | Impacted. Extended after-coming head |

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AIX 103

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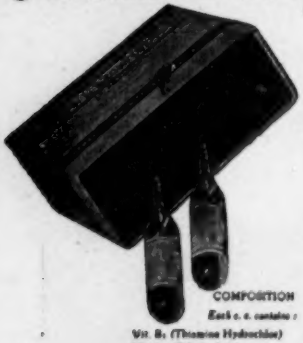

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| Nicotinamide | ... | 15 mg. |
| Calcium Pantothenate | ... | 3 mg. |
| Sodium Glycerophosphate | ... | gr. 4 |
| Potassium Glycerophosphate | ... | gr. 4 |
| Calcium Glycerophosphate | ... | gr. 4 |
| Strychnine Glycerophosphate | ... | gr. $\frac{1}{60}$ |
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pelvis, or in the uterus or ovaries, a contraction ring in the uterus, uterine inertia, etc.

The following is a statement of the presentations, positions of the fœtus which were thought to be responsible for causing the obstruction.

CAUSES OF OBSTRUCTION

(Total cases 31)

| | *Primigravida* 16 | *Multigravida* 15 |
|---|---|---|
| 1. Unrecognised occipitoposterior with or without pelvic contraction ... | 8 | ... 3 |
| 2. Contracted pelvis with occipito-anterior position | | |
| Inlet ... | 1 | ... 1 |
| Outlet ... | 2 | nil |
| 3. Transverse lie— | | ... 5 |
| with inlet contraction ... | 1 | |
| without contracted pelvis (clinical) ... | 1 | |
| 4. Breech ... ... | 2 | ... 1 (with impacted after-coming head 5) |
| 5. Big head ... ... | 1 | ... 1 |
| 6. Brow presentation ... | nil | ... 1 |
| 7. Head with prolapsed hand | nil | ... 1 |
| 8. Mentoposterior ... | nil | ... 1 |
| 9. Contraction ring ... | nil | ... 1 |
| TOTAL | 16 | 15 |

One case of big head with occiput posteriorly causing obstruction has been included under primigravida (Case 1), because the patient though pregnant for the 2nd time had an abortion at 2 months about 18 months ago, so virtually she was having the first full term labour.

One patient had a heart disease with pregnancy (mitral regurgitation). Toxæmia of pregnancy as evidenced by blood pressure above 120 systolic and 80 diastolic with œdema was present in 3 cases of primipara and 1 case of multipara. One case A.B. (Case 1) was becoming violent, boisterous with mounting of blood pressure. Craniotomy was done. The patient did not have eclampsia. One case only developed postpartum eclamptic fits but was cured.

MANAGEMENT

Nearly all the cases were sent to hospital a long time after the onset of labour pains, rupture of membranes and unsuccessful manipulations outside. In this series only one case (big head with shoulder dystocia to be described below) was admitted from the beginning of labour. This together with another primipara with outlet contraction occipito-anterior presentation to be discussed below came to hospital with membranes intact. Vaginal manipulations with or without application of forceps were done always without anæsthesia in 5 cases of transverse presentation and in 19 other cases. Oxytocics were used in 3 cases prematurely outside (2 cases with quinine and one case 1 injection of 10 units of pituitrin—the case of ruptured uterus to be discussed.

Problems of the management were many. Patients' general condition in the majority of cases was unsatisfactory. The patients were anæmic, dehydrated, with distended bladder. Excepting the two cases mentioned above all were either potentially or frankly infected (high temperature, pulse rate, toxæmia).

In about 80 per cent cases preliminary resuscitative measures had to be adopted before any operative interference could be done to relieve the uterus. These were—

1. *Sedatives*—Where fœtal heart sounds were absent morphine gr. ¼ was used in all cases and repeated in 1/6 gr. doses at intervals of 6 hrs. as necessary.

In cases with weak or doubtful fœtal heart sounds pethidine hydrochlor 100 mgm. was used as a first dose followed by 50 mgm. every 4 hrs.

2. *Fluids* by mouth, plain water, glucose water, milk, tea were allowed to patients who had to wait long before operative interference was planned.

3. *Intravenous therapy*: (*i*) Glucose, 25 per cent, 100 to 200 c.cs. repeated twice or thrice daily in cases who were not very low.

(*ii*) In severe cases 5 per cent glucose in normal saline by continuous drip alternating with 5 per cent glucose in distilled water was used as long as patients' general condition did not improve satisfactorily. The target of fluid intake was tried to be maintained between 5-6 pints in 24 hrs.

No blood transfusion could be given in any case. Human plasma was used in two cases only.

4. *Management of bladder* was a formidable problem in many cases where the presenting part was jammed in the pelvis. A rubber catheter was tried first, if necessary with pushing up the presenting part with fingers in the vagina. In 6 cases this attempt failed even under anæthesia and the bladder had to be drained suprapubically. The puncture was made about 2½"—3" above the symphysis pubis.

5. *Bowels* were emptied by only a single low enema.

6. *Combating infection*: (*a*) Vaginal examinations were as few as possible with the safety of the mother and the fœtus. Masks, sterile gowns and gloves were used always and the vulva and vagina were thoroughly cleaned with Dettol.

(*b*) Vulva was shaved.

(*c*) Mothers were asked not to touch the genitals with their hand. In toxic patients hands were tied.

(*d*) Chemotherapy—Sulphonamides, mainly sulphadiazine and sulphamezathine were used in full therapeutic doses from the very beginning during the period 1945 to earlier part of 1947 with occasional administration of penicillin. The supply of penicillin then became plentiful, and in addition to sulphonamides penicillin was liberally used. Initial dose

was 100,000 units followed by 50,000 units 3-hourly of crystalline penicillin. Streptomycin was not used in any case.

(*e*) Antitetanic and antigasgangrene sera—Two cases developed puerperal tetanus of which one died. Both had been interfered outside. Since then every case had A.T.S.—1500 units I.M. as a prophylactic. In cases with foul smelling liquor amnii antigasgangrene serum was used in 20,000 unit doses—once or twice. Excepting the cases of tetanus, no case died of sepsis.

A few words about the uterine behaviour in cases of obstruction will perhaps be not out of place here. This has been very aptly described by Jeffcote (1950). The following description is mainly based on his statements.

The early reaction to an obstruction is an irritability of the uterus, i.e., the uterus contracts forcibly and more frequently giving exaggerated sensation of normal labour pains. If the obstruction is not relieved, the uterus goes on contracting forcibly and there is more and more retraction as time goes on. The strongly contracting upper uterine segment is demarcated from the lower segment by a boundary line which is called 'Retraction or Bandl's ring' which ascends higher and higher as time goes on. Retraction ring could be detected in about 50 per cent of our cases. Recently White (1949) asserted that Bandl's ring is not something visible or palpable as a ring. He suggests that the clinical demarcation between the contracted upper uterine segment and passively dilated lower uterine segment is caused by the distended and œdematous fundus of the bladder. In the series under discussion the ring seemed to persist even after successful drainage of the bladder (either by a catheter or suprapubically). No definite assertion can be made as the series of cases is too small. With increased retraction there is more and more impairment of placental circulation with increasing risk to the fœtus.

At this stage patient complains of severe backache and is never free from pains which persist even after the passing away of a palpable contraction. Uterus becomes more tender as time goes on.

If this stage is neglected, the thinned out lower uterine segment ultimately ruptures. The uterine rupture also occurs after injudicious attempts at manipulation and operative delivery without complete surgical anæsthesia. In our series there was one case of rupture uterus after decapitation for transverse presentation (to be stated below). Premature exhibition of oxytocics, e.g., quinine, ergot or pituitrin also encourage premature tonic uterine contraction which may lead to rupture of the uterus in presence of obstruction. In this series one case was admitted moribund with ruptured uterus due to 10 units (1 c.c.) of pituitrin given to a 2-para in labour with contracted pelvis. Diagnosis was verified at postmortem. Oxytocics were also administered in two other cases where quinine was used but no rupture of uterus followed.

Constriction ring dystocia—This is a ring which develops spontaneously or following intrauterine manipulation or after administration of oxytocics in a hypertonic uterus. This grips the fœtus tight and may itself cause obstruction. Common site is the junction between the two uterine segments but it may form anywhere in the uterus. Rudolph describes that this ring may occur in cervix as well and describes it as an atavism comparable to the physiological constriction in bicornuate uterus in lower animals. It produces abdominal pain and backache. The most certain diagnosis is by intrauterine palpation. The cervix hangs loose below the presenting part and may be pulled during a contraction. This ring by itself does not lead to rupture of uterus unless hasty intrauterine manipulations are made. In the series under discussion constriction ring was palpated in one case only.

### Operative Treatment

Operative treatment was undertaken as soon as it was thought that the patient would stand the operation reasonably well. Patients whose general condition was fair were operated within half to one and a half hour of admission. Patients who were poor operative risks, who had incompletely dilated cervix or uterine inertia were closely watched and resuscitated and were operated when condition improved. Delay in these cases varied between 2 hours to 54 hours after admission into the hospital. Time spent in the resuscitation gave good dividends as far as mother's health was concerned. In an occipitotransverse presentation, who had failed forceps outside, forceps was applied to the head after rotation of the head. In this case a little risk was taken regarding one mother. F.H.S. was present before operation 150 p. m. The cervix was effaced and fully dilated. The baby was asphyxiated and was revived after about 10 minutes. A case of ruptured uterus admitted moribund could not be sufficiently revived and operated.

*Anæsthesia*—Choice of the anæsthesia was left to the anæsthetists. Nitrous oxide, oxygen and ether were used in majority of cases. In two cases of forceps and one case of extraction of the aftercoming head (Case 5) pentothal sodium was used as an anæsthetic agent.

*Types of operation of different variety of cases*—1. Occipitoposterior—Craniotomy was done in 5 cases. The most difficult case was Case 1 in Tables 1 and 2. This patient had a transverse diameter of outlet of 2¼" only. The head was big, the uterus was vigorously contracting with 'retraction ring'. After perforation and washing out the brain matter extreme difficulty was experienced to bring out the base of the skull. A wide episiotomy (mediolateral) was done and the head was brought out after basiotripsy. Mother stood the operation fairly well.

Forceps was applied in three cases, one of which was a failed forceps outside as mentioned above. One baby was lost due to white asphyxia.

2. Contracted pelvis with occipito-anterior presentation—Inlet contraction was definitely known to be present in one case only where the head was floating above the brim. The sacral promontory was easily reached with fingers and measured 4" only (which shows conjugate vera to be approximately 3¼" or 3½". Patient was in labour with membranes ruptured and cord prolapsed for 47 hours and fœtal heart sound was inaudible. A craniotomy was done. Other cases had possibly inlet contraction, but as they could not be checked, they have been excluded from the group.

3. Outlet contraction—Two cases were seen with definite outlet contraction (narrow subpubic angle and transverse diameter of outlet). One of these cases was a primigravida with mitral heart disease. After being in labour for 36 hours she started cardiac failure. Cervix was nearly fully dilated and a craniotomy was done. Cardiac failure progressed and she had acute dilatation of stomach and died after two days. The second case was a primigravida with toxæmia and premature rupture of membranes. Head was not engaged at the time of admission. A suggestion of cæsarian section was turned down by relatives. After 54 hours of labour, forceps could be applied after episiotomy and a living baby was born.

4. Transverse lie—Seven cases, two primigravidæ and rest multigravidæ were encountered.

Decapitation was done in 5 cases and internal version in two cases. In the version cases breech was brought down. One baby died of asphyxia.

One is tempted to mention a particularly difficult case of decapitation.

Patient, a Kol woman aged 18, primipara, came with hand prolapsed after a rupture of membrane 3 hours before. Uterus contracting and relaxing well, F.H.S. present, regular, 135 p. m.; B.P.—122/84 mm. of Hg. External conjugate diameter was 6½". Subpubic angle wide, no contraction in the outlet. No evidence of rickets was present. Considering the narrow anteroposterior diameter of inlet a lower segment cæsarian section was advised and refused. Patient was taken away from the hospital for a day, to come back again with a contracted uterus, prolapsed hand which was œdematous and absent F.H.S. Abdominal operation was again refused and a decapitation forced upon. Trunk was brought out easily but the head kept on slipping away. It was caught with Lion's forceps, even then a craniotomy could not be done. A midwifery forceps was then applied over the Lion's forceps, decapitation was done. Base of the skull could not be brought out by conjugate diameter and had to be negotiated with difficulty through the transverse diameter of the inlet. Maternal soft parts were considerably injured but healed well after stitching. The mother made uneventful recovery. The baby was 5 lbs. 12 oz. in weight (head and trunk).

5. Breech—Three cases of which 2 were primiparæ and one multipara. In one case breech was big and impacted. Groin traction followed by difficult extraction of the head was done for a big baby (7 lb. 7 oz.) which was dead before. The second case with extended legs was delivered with a living baby after episiotomy. The multipara had an impacted aftercoming head when she came to the hospital (Case 5). Extraction was easy with pentothal anæsthesia.

6. Big head—Two cases were encountered. The first in a primipara, floating above the brim. Vaginal examination revealed wide suture lines and a big head (hydrocephalus). Perforated. A little discussion is necessary for the multipara case with big baby.

Patient, 6th gravida, 2nd and 5th were breech presentations of which 5th had extended legs and arms with baby weight of 9 lb. 12 oz., confined by another 3 years ago.

The abdomen was unduly large at term. X-ray revealed a big fœtus, birth head down and no cephalopelvic disproportion. Mother allowed to go into labour normally. After a labour of 9 hours the head was born naturally. Difficulty arose with the shoulder. It was not born naturally. Anæsthesia was given, and attempt made to rotate the shoulder manually—failed. Repeated attempts at it failed, ultimately bilateral cleidotomy was done and shoulders extracted with prolonged endeavour. Mother had a lax perineum, hence episiotomy was not done. She had a complete perineal tear which was repaired and healed well. Baby was white with asphyxia. Weight 11 lb. 12 oz.

7. Brow presentation—came as a failed forceps case. A craniotomy was done.

8. Head with prolapsed hand—came after failure of forceps—craniotomy.

9. Mentoposterior—came after attempts at forceps. It was left mentoposterior jammed, could not be rotated either forwards or backwards Craniotomy was done. Mother died of shock.

10. Contraction ring—was felt only in one case. Chloroform failed to relieve the ring. After waiting for 2 hours the ring seemed a little loose. Craniotomy with very gentle extraction of the head was done.

One case died undelivered. She was a 2-para with premature stillbirth before. Abdomen was tense, F.H.S. not audible, patient moribund and died after 2½ hours. Autopsy revealed a generally contracted pelvis with ruptured lower uterine segment.

POST-OPERATIVE COMPLICATIONS:

*Postpartum hæmorrhage* occurred in majority of cases. Two cases needed manual removal of placenta. Both died. At that time another was not bold enough to give intravenous ergometrine or I. M. pituitrin with placenta inside. Bleeding was controlled in those cases after manual removal of placenta by hot vaginal douches and prolonged bimanual compression of uterus. No blood transfusion could be given and both patients died of shock.

*Sepsis*—Patients had varying amount of sepsis during puerperium. One case had pyometra which was cured with drainage and chemotherapy.

*Ruptured uterus*—One case admitted moribund as described above. The other case had rupture after decapitation. She developed shock and died after 13 hours. A postmortem showed an irregular tear in the left lateral wall of uterus about 2½" long. A big hæmatoma had collected within the left broad ligament.

*Lacerations* were stitched. Episiotomy was done in all primiparæ with forceps and in difficult craniotomy cases. One case with shoulder dystocia had a complete perineal tear which healed well after suture.

*Post-operative distension*—was troublesome in some cases. Flatus tube, morphia gr. 1/6 every 6 hours, gastric suction helped all the cases. One case died of gastric dilatation and cardiac failure.

*Fistula*—A self-retaining catheter with bladder washes with 1 in 3000 acriflavine twice daily was used in all cases of prolonged compression of bladder base. No case developed postoperative fistula.

*Retention of urine*—Postural manipulations, hot bag on abdomen were tried first. Catheter 8 hourly passed in resistant cases with aseptic precautions.

*Tetanus*—Two cases developed tetanus in puerperium. One died. The other improved with the antiserum which was given both intravenously and intramuscularly. Patient was kept under heavy sedation.

DEATHS. 1. Ruptured uterus—two cases. 2. Postpartum hæmorrhage—two cases. 3. Puerperal tetanus —one case. 4. Shock following craniotomy in a case with mitral lesion—one case. 5. Shock following craniotomy for mentoposterior—one case. Total—7 cases.

Nearly all the complications are preventable with proper antenatal care and early detection of the abnormalities during labour. Many of the patients could not be sent to hospital early due to either transport difficulties or reluctant relatives who wanted something to be done at home. Operative interference had to be delayed due to low general condition of the patients who were anæmic, illnourished, dehydrated and had to be resuscitated before any operative help could be rendered. Many of them stood the operation badly and blood transfusion which is of vital importance to postoperative treatment of shock and blood loss was not available and one had to be dependant on intravenous saline with glucose. A combined endeavour from all sources need to be made to improve the results.

## SUMMARY

1. Some cases of obstructed labour have been presented.

2. Importance of proper antenatal care and early diagnosis of abnormalities are stressed.

3. Premature administration of oxytocics and injudicious manipulations are discouraged.

4. Improvement of transport facilities and education of patients and relatives stressed upon so that they can seek help without delay.

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## *CASE NOTES*

# DYSGERMINOMA OVARII

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Dysgerminoma is the name given by Robert Meyer in 1931 to a rare ovarian tumour, first described in 1911 by Chenot under the name "Seminome de l'ovaire". Meyer suggested the name "disgerminoma" (dis—two, germinoma—tumour of gonad) because the same tumour originates from the male and from the female gonad. In the male the same tumour was first described by Chevassu in 1906. As it became more widely believed that the histogenesis of this tumour is dysgerminal, i.e., from indifferent cells of the undifferentiated stage of gonadal development which stray away from the main stream of germinal development in gonads which later become ovaries or testes and remain dormant for years, the name was slightly changed to "dysgerminoma", a term which is generally adopted to-day.

Two cases are recorded here because of the rarity of the condition, and especially because the Indian literature contains scanty reference to the subject. Curiously enough these two cases came under the care of one of us within a period of three and half months.

## CASE REPORTS

*Case 1*—A. R., a nulliparous married woman, 20 years of age, was first seen on 8-2-51. She noticed a lump in the lower abdomen for the first time about a month and half ago. It was painless at the beginning but since about a week she complained of some abdominal pain and discomfort. Menarche at 14 years. Periods were regular with 3-4/28 days cycle but scanty flow. Last menstruation 10 days ago, lasted for 3 days with the usual amount of loss.

She suffered from typhoid fever 10 years ago. On examination she was found to be of average build, slightly anæmic; the breasts and the external genitalia normally developed; pubic hair of feminine distribution; no hirsuitism and no enlargement of clitoris.

A firm solid tumour was found to arise from the pelvis and extend up to the level of the umbilicus, occupying the middle of the lower abdomen, smooth surface, tender, margins well-defined but mobility greatly restricted. There was no clinical evidence of free fluid in the peritoneal cavity. The tumour was dull on percussion and silent on auscultation.

Her heart and lungs were normal. There was no evidence of pleural effusion clinically nor radiologically.

Bimanually the uterus was found to be small and lying backward, behind the tumour. The appendages could not be clearly identified.

Clinical diagnosis of solid ovarian tumour with the possibility of dysgerminoma ovarii was made and the patient was admitted in hospital on 15-2-51 for operation. During this interval of 7 days the tumour increased in size and extended to 2 fingers' breadth above the umbilicus. It became very tender and was causing constant pain.

Laparotomy done on 20-2-51 revealed some straw coloured free fluid in the peritoneal cavity and a solid tumour arising from the left ovary. There was no torsion of the pedicle and no adhesion. The capsule of the tumour was intact but there were numerous areas of subcapsular hæmorrhage. The uterus was slightly smaller in size. The right ovary and the uterine tubes were normal in appearance. No metastases were found.

As the capsule was intact and no metastases were found conservative treatment was decided upon. The tumour was removed along with the left tube in the usual way. The left infundibulopelvic ligament was found to be greatly thickened, infiltrated and the walls of the contained vessels friable.

About 10 hours after the operation the patient began to show signs of cardiac failure and died after 2 hours. No autopsy was permitted.

The tumour measured 8" × 6" × 4" with a slightly nodular external surface. It had a smooth and firm capsule. The tumour had a typical "rubbery" consistency. The cut surface was grayish yellow, homogeneous in consistency, with several areas of degeneration and hæmorrhage.

Section showed areas of large, round, ovoid and polygonal cells with abundant clear and very pale staining cytoplasm, and large round and comparatively deeper staining nucleus and a fair number of mitotic figures. Groups of cells were separated by fibrous septa which showed areas of hyalinization and lymphocytic infiltration. The section showed marked cellularity with very little connective tissue. Extensive degeneration marked the picture and there were a few symplasmic giant cells (Fig. 1, *vide* Plate). Tissues from six different areas were sectioned and only two showed non-degenerated areas giving the picture described above.

*Case 2*—M. K., a prepubertal school girl, aged 13 years, was first seen on 30-5-51. She noticed a gradually increasing swelling of the lower abdomen for one year. The rate of growth has been rather rapid for the last three months. It was painless before but for the last 3 months she has been complaining of some pain over the swelling. About 6 months ago she had acute retention of urine and the bladder had to be emptied by catheter for 3 days, after which she could pass urine naturally.

General health was normal, but there was no sign of puberty.

A firm solid tumour was found arising out of the pelvis and extending to 3 fingers' breadth above the umbilicus. Its surface was slightly nodular and its mobility was restricted. There was no evidence of free fluid in either the peritoneal or the pleural cavity.

Rectal examination revealed a hypoplastic uterus lying behind the tumour—appendages not clearly definable.

With the provisional diagnosis of solid ovarian tumour, most probably dysgerminoma, the patient was admitted in hospital on 2-6-51 and laparotomy, done on 4-6-51, revealed a small amount of free fluid of yellowish colour in the peritoneal cavity. A kidney-shaped solid tumour was found arising from the right ovary. The capsule of the tumour was intact and there were several areas of subcapsular hæmorrhage. The right uterine tube was greatly elongated and stretched over the tumour. The pedicle was broad but twisted one full turn. There were no adhesions and no metastases. The tumour together with the right tube was removed. The left ovary was hypoplastic and measured ½" × ½" × ½". The uterus was also undersized considering her age and measured only 1½" × 1" × ½".

The patient made an uneventful recovery and was discharged on the 10th post-operative day, soundly healed. She was last seen on 3-12-51 and was perfectly well.

The tumour measured 10" × 7" × 4" with slightly nodular external surface, smooth, firm and intact capsule. Rubbery in consistency, cut-surface homogeneously grayish with areas of hæmorrhage and cystic degeneration bounded by ragged walls. Sections showed the typical appearance of dysgerminoma. These sections were also characterised by areas of marked cellularity interspersed in wide areas of degeneration and hæmorrhage (Fig. 2, *vide* Plate).

## Discussion

The anlage of the sex gland, either testis or ovary as the case may be, appears as an area of thickened epithelium on the ventrimedial aspect of the mesonephros (wolffian body) in the fifth week of fœtal life. Up to the seventh week the genital gland possesses no differentiating features and it is impossible to determine from histological examination whether the epithelial mass is to be a testis or an ovary. Some cells of the gonad at this undifferentiated phase stray away and remain as rests, and Meyer (1931) believes that these cell-rests constitute the origin of dysgerminoma. This theory of the origin of dysgerminoma explains the hormonically inertness of this tumour, its origin being from cells before they were tinctured with either male or female attributes. It also explains the occurrence of this tumour in ovary as well as in testis. Meyer's theory of the histogenesis of dysgerminoma is supported by Novak and Grey (1936) and Novak (1948).

There are other views regarding the origin of dysgerminoma. Meigs (1934), Ewing (1940), Teilum (1944) and Santesson (1947) believe that dysgerminomata arise as a unilateral development of teratomata. The association of dysgerminoma and teratoma has occasionally been noted in literature (Novak, 1947;

Chalmers, 1950; and Klopper, 1951). It has also been suggested that it is derived from ovarian mesenchyme (Barzilai, 1934; Spencer and Reel, 1947); from the testicular remnants (Hoche, 1930; Willis, 1948) and from embryonal rests along the course of the müllerian ducts (Schiller, 1934).

It is pre-eminently a tumour of early life. Of the two cases recorded here one was a pre-puberty girl of 13 years and another a young adolescent of 20.

It is generally believed that dysgerminoma occurs in individuals with subnormal gonadal development or in pseudo-hermaphrodites as the earlier cases of Meyer (1931) happened to be so. But as cases have accumulated it has become more than apparent that it may occur in ostensibly normal women. In the present two cases, the uterus was slightly smaller in Case 1, but the uninvolved ovary, the tube were normally developed, whereas in Case 2, the uterus and the uninvolved ovary were small. The developmental abnormalities may therefore be of various types and grades.

The first evidence of its presence, as usual, was the detection of a mass in the lower abdomen in both the cases with no characteristic effect on menstruation. Dysgerminoma however often occurs in women amenorrhœic as a result of gonadal deficiency.

Most authorities believe the tumour to be undoubtedly malignant and Novak (1948) quotes a recurrence rate of 20 to 25 per cent. The malignancy, however, varies in individual cases. The degree of malignancy is certainly less than the common types of primary ovarian carcinomata and cure has often followed simple removal of the adnexa of the affected side. When the tumour is well encapsulated, the prognosis is in general good, but in the infiltrating variety the outlook is very unfavourable.

Surgical treatment is always advisable, but there is no unanimity of opinion as to the extent of operation and also of the value of radiotherapy. In the case of young patients with well-encapsulated unilateral tumour, it is generally agreed that the treatment should be conservative consisting of unilateral salpingo-oophorectomy. Careful follow-up should be carried out when this plan is followed and radical operation should be resorted to in case of any evidence of recurrence. In the case of elderly patients total hysterectomy with bilateral salpingo-oophorectomy is done. When the tumour is of the infiltrating variety radical removal of the pelvic organs is indicated and this should be followed by deep x-ray therapy in spite of the divergent views of different authors as to the radiosensitivity of the tumour.


### Summary

Two cases of dysgerminoma ovarii are described both occurring in apparently normal young individuals, but in both there was evidence of underdevelopment of the genital organs.



### Acknowledgment

We wish to record our gratefulness to Dr. P. Bhattacharya, Superintendent, Fraser Hospital, Burdwan, for permission to publish the records of these two cases and to the staff of the Pathology Department, Ronaldshay Medical School, Burdwan, for their help in preparing the specimens


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## RIGHT-SIDED SPONTANEOUS PNEUMOTHORAX COMPLICATING THERAPEUTIC PNEUMOPERITONEUM


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The artificial pneumoperitoneum treatment in pulmonary tuberculosis is again gaining momentum after a lapse of few years. Its wide use justifies the increase in number of reports on its complications. Out of other complications spontaneous pneumothorax is one. So far more than 20 cases have been reported in the literature by various writers. Out of these, only two cases were fatal (Smith, 1943 and Yannitelli, 1949). The present report is of a non-fatal spontaneous pneumothorax occurring twice in the course of therapeutic pneumoperitoneum.

### Case Report

H. K., female, aged 20 years, admitted in Tuberculosis Hospital, Chelru, Punjab, on 30-8-1951. Before admission, she had 25 gm. of streptomycin. The pneumoperitoneum was started while she was at Amritsar in July, 1951.

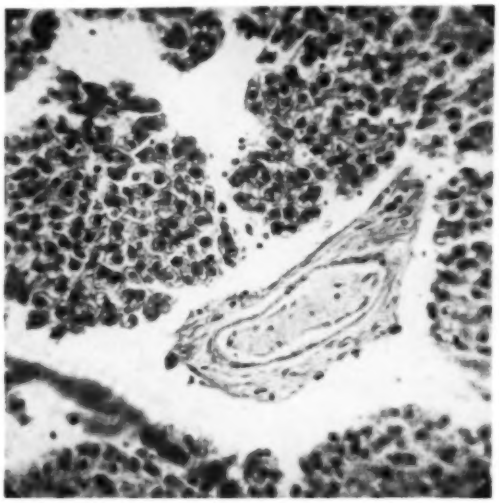

Fig. 1

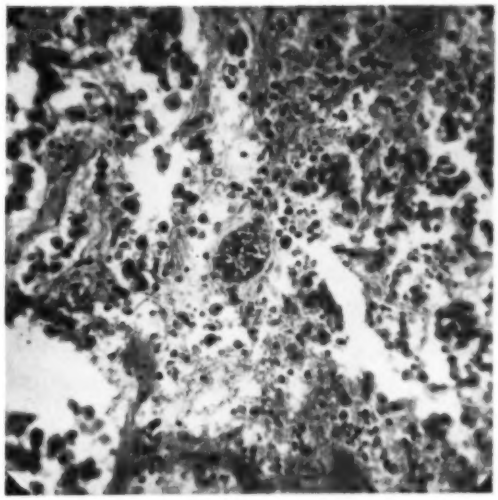

Fig. 2

SUR ROY AND CHAKRAVARTY— *Dysgerminoma Ovarii.*
*(pp. 370-72)*

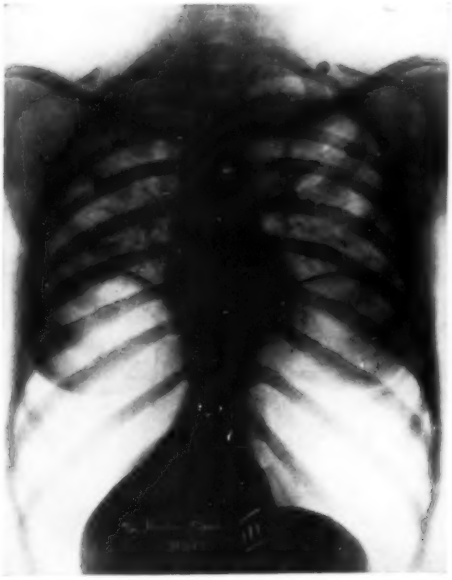

Fig. 1

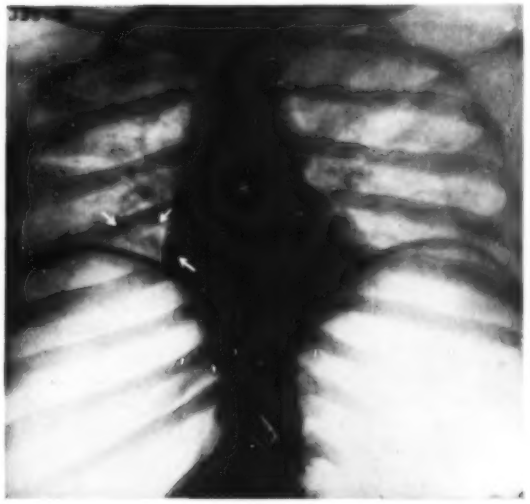

Fig. 2

VAID— *Right-sided Spontaneous Pneumothorax Complicating Therapeutic Pneumoperitoneum.*
*(pp. 372-74)*

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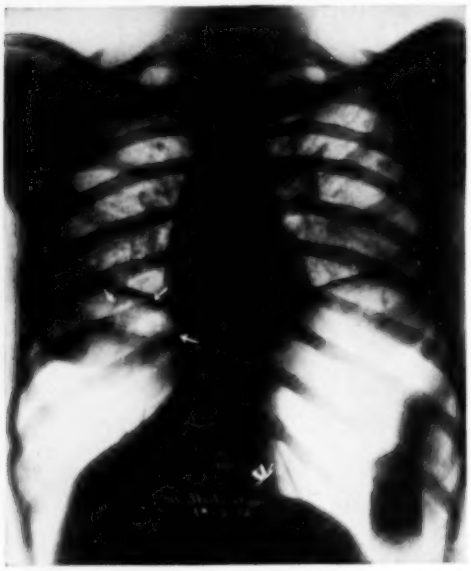

Fig. 3

VAID— *Right-sided Spontaneous Pneumothorax Complicating Therapeutic Pneumoperitoneum.*
*(pp. 372-74)*

Fig. 1

BOSE— *Homogenous Bonegraft.*
*(pp. 374-75)*

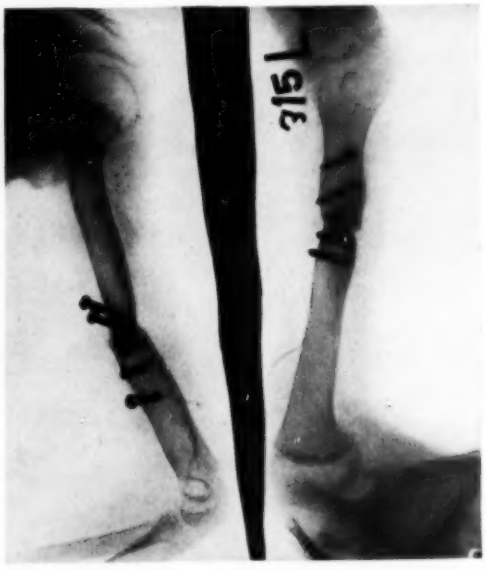


Fig. 2

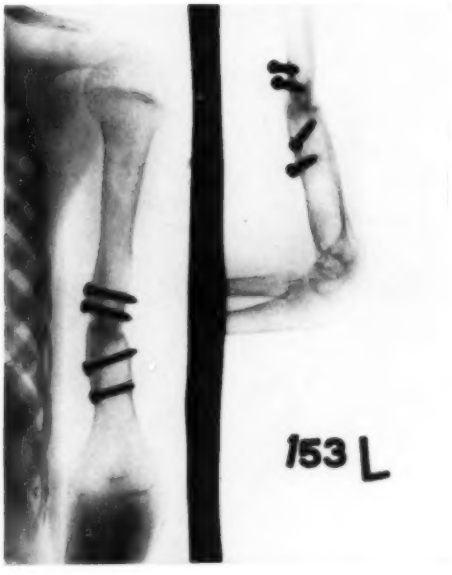


Fig. 3

BOSE— *Homogenous Bonegraft.*
*(pp. 374-75)*

On her admission to the hospital, pneumoperitoneum refills were continued at weekly intervals, usually with high positive pressures ranging between + 12 and + 14. Clinical condition being good, maximum temperature being 99°·8F. and sputum being positive for A. F. B.

Skiagram taken on 3-9-1951, showed bilateral pulmonary tuberculosis. *Right*—upper and middle zone showed dense patchy opacities with an area of radiolucency in the infraclavicular zone. *Left*—upper zone showed dense patchy opacities. The rise of both the domes of the diaphragm with pneumoperitoneum was quite good.

With pneumoperitoneum treatment, she was showing improvement in general condition. Her weight increased by 12 lbs. in two months. B. S. R. showed gradual decline from 50 mm. to 5 mm., per hour. The amount of pneumoperitoneum was increased to 900 c.c. every week. A skiagram (Fig. 1, *vide* Plate) was taken on 6-11-51.

In December, 1951, a skiagram in lordotic view was taken to locate the position of cavity under the clavicle. The skiagram showed a bleb (Fig. 2, *vide* Plate) over the right diaphragm but no attention was given to it at that time. She got her usual refill 900 c. c. on 17-12-1951. On the morning of 21-12-1951, while straining for defæcation, she felt a stabbing pain on the right side with dyspnœa and pallor. Clinically, there were signs of spontaneous pneumothorax, confirmed on screen examination, which showed that the level of the diaphragm which was at the 3rd rib anteriorly has come down to the 5th rib anteriorly, on both sides there was still some air under the diaphragm. She was immediately put for aspiration of air. 1000 c. c. of air was aspirated from the pleural cavity, the initial pressure being + 2 and + 7 and final pressure − 6 and − 3. Next day the patient was again screened; a fluid was seen in pleural cavity, there being no air in the abdominal cavity. About 100 c. c. of fluid was aspirated. It was clear fluid and on culture no tubercle bacilli could be demonstrated. X-ray on 25-12-51 showed the lung completely expanded with no air left in the abdominal cavity.

No refills were given for one month. As the patient was still positive for A. F. B., pneumoperitoneum was started again on 29-1-1952. Refills were slowly increased, 900 c. c. every week as before. Routine x-ray taken on 19-3-1952 showed good rise of the diaphragm on both sides, upto 4th r.b anteriorly. There was seen a radiolucent bullous bleb (Fig. 3, *vide* Plate) under the diaphragm, at the same place as in lordotic view taken on 13-12-1951, prior to spontaneous pneumothorax. She got her refill on 24-3-52 upto 900 c.c. with almost similar high intraperitoneal pressures. On 27-3-52, at about 4 p.m. after her afternoon nap, the patient got up with pain (right side) and dyspnœa.

Clinically, there were again signs of spontaneous pneumothorax. She was screened and it was found that spontaneous pneumothorax developed along with fluid formation. 700 c. c. of air was withdrawn with initial pressure + 2, + 6, the final pressure being − 10, − 2. Next day, another 500 c. c. of air was withdrawn. Because of fluid formation thoracoscopy could not be undertaken. On subsequent screen examination, no air in abdominal cavity could be seen, but fluid in the pleural cavity persisted. It was taken out for examination. It was clear, no tubercle bacilli could be demonstrated on cultural examination. Repeated aspirations of fluid were done twice weekly, each time 200 to 300 c. c. of fluid being taken out. Clinically, the patient showed no rise of temperature with development of fluid. On the other hand, her sputum became negative for A. F. B. (on concentration method of examination of the gastric washings). B. S. R. remaining constant, and the patient not showing any dyspnœa, it was decided to convert the spontaneous pneumothorax into therapeutic pneumothorax, at the end of April, 1952, when the fluid had absorbed. The patient is still in the hospital and is having A. P. refills at weekly intervals upto 300 c.c. with good negative pressures. A few adhesions are seen in the upper portion of thoracic cavity.

## Discussion

Regarding the pathology of this condition, there are different opinions put forward by various writers. Anderson and Winn (1945) attributed it to the tuberculous ulceration of the diaphragm. Banyai and Jurgens (1940), believed that air tracked into mediastinum *via* anatomical openings, such as aortic and œsophageal hiatuses, causing mediastinal emphysema and subsequent rapture of air into the pleural cavity. This theory does not explain the occurrence of spontaneous pneumothorax only on right side in every non-fatal case reported in recent years in literature. Secondly, there is no emphysema in the reported cases.

The other view put forward by Mithohelle (1947) is the rupture of the diaphragm. This view is widely held by various writers in the recorded reports of the cases. The thoracoscopic examination as reported by them showed evidence of rupture of the diaphragm. Repa and Jacobson (1951) saw a posterolateral slit-like opening in the diaphragm. In Wynn William's case, a bright red area was seen in the diaphragm, anterolateral to the vertebral column. A lesion suggesting organising blood clot was seen in the reported case of Spencer Jones and Yuill. In the case mentioned by Nozzoli, Epstein and Molner a rising endopleural pressure was recorded in the manometer of pneumothorax apparatus, when pneumoperitoneum was given experimentally on the next day of the occurrence of spontaneous pneumothorax showing thereby the opening between the peritoneal cavity and pleural cavity. On thoracoscopic examination, Laird (1945) has recorded, the occurrence of blebs protruding into the pleural cavity during pneumoperitoneum treatment and he has expressed this view that their rupture may lead to pneumothorax. While doing pneumolysis Dr. J. Hallam Cope, also noticed a large bleb on diaphragmatic pleural surface in a case who got spontaneous pneumothorax after therapeutic pneumoperitoneum treatment. Its size varied with each respiration depending upon the intra-abdominal pressure.

These blebs (Ross and Fabre, 1951) may represent the herniation of the peritoneum through a diaphragmatic defect, resulting in a pneumocele, beneath the diaphragmatic pleura. This then is a potential source of spontaneous pneumothorax, merely requiring sufficient increase in the intra-abdominal pressure to rupture these blebs. (The report of the present case points to this possibility).

As to the question why the spontaneous pneumothorax occurred in most of the cases (non-fatal

cases) on the right side. The view put forward by Ross and Fabre (*loc. cit.*) seems to be convincing, depending mainly upon the following two factors:

(1) The presence of diaphragmatic defect usually embryological, through the foramen of Morgagni, noticed on the right side (Harington, 1948). This is a potential source of herniation, with hernial sac of peritoneum. Because of the liver on the right side, there is no constant strain or wedging in of the intra-abdominal contents against these defects whereas, if the congenital defect is on the left side, it is constantly being wedged in by omentum, and intestines, thereby enlarging these defects and may prove fatal even on induction of pneumoperitoneum.

(2) Secondly, when the liver and the diaphragm are separated on pneumoperitoneum treatment, the right dome of the diaphragm, is put under great stress, which ultimately causes rupture of defective air sacs or blebs, under high intraperitoneal pressures.

As regards phrenic crush, it plays no significant part because it is being done as frequently on the left side as on the right. It strikes the mind, after reviewing all the cases on record as to why all the cases so far reported are non-fatal? It is definitely attributed to the size of the embryological defect (Ross and Fabre). Larger defects would produce early appearance of spontaneous pneumothorax. It may even appear on primary induction of pneumoperitoneum. But, only the smaller defects could become evident clinically, when excessive intra-abdominal pressures were present (more than usual as in pneumoperitoneum) such as on straining for defæcation (in the present case) or intractable cough.

In most of the cases on record, spontaneous pneumothorax occurred with loss of abdominal air in pneumoperitoneum cases. It is also obvious that once air has made its way from peritoneal cavity to the pleural cavity, it will do so again in the majority of cases.

In the present case, the spontaneous pneumothorax is being continued as therapeutic pneumothorax, with the result that the sputum became negative for A. F. B.


### Summary

A case is reported of spontaneous pneumothorax (right-sided) occurring twice in the course of therapeutic pneumoperitoneum. The cause is attributed to the rupture of blebs resulting in herniation of peritoneum through the diaphragm.


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# HOMOGENOUS BONEGRAFT


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Macewen (1880) first successfully used homogenous bonegraft to bridge a defect about 5" in the shaft of the humerus of a boy suffering from osteomyelitis. But such grafting fell into disfavour when in 1911 Albee introduced and advocated open reduction of fractures with grafts. Most of the grafts commonly used are autogenous though Macewan's grafts were 5 small pieces from 5 patients. If proper quantity and quality of autogenous bone is not available grafts have to be taken from donors. By different methods of preservation, grafts from donors can be stored and used when necessary. The following case report is that of a successful homogenous bonegraft in an established case of non-union of fracture of the shaft of the humerus in a boy aged 9 years. The graft was taken from another patient who had the autogenous bonegraft a few days previously and the excess graft was autoclaved and preserved.

### Case Report

A Hindu male child (M. D.) of good general health sustained fractures of the shaft of the left humerus in September, 1947. For two months he was treated outside in a moffusil hospital and then attended the orthopædic department. The fracture was reduced under screen and plastered in abduction position and maintained for two months without any union. Open reduction was done on 1-9-48. After plaster immobilisation for five months the x-ray examination revealed established non-union (Fig. 1). He was readmitted on 19-2-49 and operated on 27-4-49. During operation the bone ends were curetted till they bled, the medullary canal on either side opened and the fragments manipulated in position. The autoclaved and preserved bonegraft mentioned above was cut to proper size and fixed by 4 vitallum Sherman's screws as onlay graft. The wound was closed and the arm put in abduction plaster jacket. X-ray on 20-2-50 showed union of fracture with incorporation of the graft (Fig. 2) and the final x-ray on 17-3-50 demonstrated complete bony consolidation (Fig. 3). There was no necrosis of the graft which was incorporated in the callus. The boy has now a completely useful limb.

### Discussion

Bonegrafts serve the dual purpose of internal splintage and as a scaffolding for osteogenesis. According to Key (1934) the formation of new bone depends on the absorption of calcium and other salts from the transplant i.e., graft supplies a local surcharge of calcium. If the graft is autoclaved it loses all living properties but serves as a strong internal splintage plus local depot of calcium salts. The graft is taken up by creeping substitution. No necrosis was observed in our case in the subsequent x-ray plates. This is a very significant fact and proved that the graft though autoclaved behaved as preserved living grafts.

The advantage of a homogenous graft is that operating time is lessened with less shock to patients. The method is also suitable for children, where sufficient length of autogenous bone cannot be taken. The question of transmission of disease have been eliminated by autoclaving. Even in living bone grafts such as obtained from established bone banks (where preservation is by freeze or Merthiolate methods), determination of blood groups is not essential as is the experience of Leonard Bush (1947) and Alberto (1942).

Wilson (1947) proved that if bone was preserved by deep freeze methods at temperature up to 20°F. the average period of preservation was 42 days. Refrigerated bone is preserved in fresh state and the process of invasion, resorption and transformation takes place more early than boiled or dried bone in which organic elements are dried and coagulated.

This case is worth reporting as it stresses the necessity of establishing bone banks in large hospitals.

SUMMARY

A case of homogenous bonegraft in a child of 9 years with ununited fracture of the shaft of the humerus is presented.

The graft was autoclaved before use. Graft was taken up by creeping substitution and union was sound after operation.

ACKNOWLEDGMENT

I am indebted to Dr. D. C. Chakravorty, Principal & Superintendent, Medical College Hospitals, Calcutta, for permission to publish the case and to Mr. M. L. Barman, Surgeon-in-charge, who operated upon the case, and Dr. S. K. Dutta, Orthopædic & Fracture Department, Medical College Hospitals, Calcutta, for guidance.

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# MALFORMATION OF UTERUS

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Congenital or acquired malformations of the uterus are now and then met with in the clinical practice of the gynæcological and obstetrical wards of a general hospital. Many women possessing such malformed uteri are also found to carry one or more pregnancies to successful termination. It is of course true that many cases of various malformations of the uterus are not reported in the literature, and also that a still larger number of such cases go about without ever being detected. The uterus being reported about had features apparently not covered by text-book descriptions of common anomalies.

## CASE REPORT

Patient S. B. D., Hindu, female, aged 40, was admitted on 13-6-52 in the C. M. S. Hospital complaining of vaginal bleeding off and on for 2 months, and generalised swelling for 15 days. The patient said that she was having a vaginal bleeding which would fluctuate in amount with occasional exacerbations but that it had never left her for the last 2 months although it had started apparently as an ordinary menstrual phase. The bleeding had, however, much increased for the last 15 days and she was, therefore, laid up in bed. She had a similar bout of bleeding about 3 years back but that was much less in amount and of shorter duration, and it had stopped spontaneously.

*Menstrual history*—Menarche at 13 years. Periods were regular with 4/28 days cycle before, which had of late gradually become 10/30 days. There were increased losses recently, but no clots nor pain or any other abnormality.

*Obstetric history*—2 children; both full-term, healthy normal childbirth; both alive, younger aged 26 years. No other pregnancies. Widow for 20 years.

On examination, she was an adult woman aged about 40, of average build, pale with general anasarca and puffy face. She was dyspnœic with slight cyanosis of lips, ear-lobes and finger tips. There was well marked anæmia, moderate œdema (specially in the lower extremities), moist but glazed tongue, healthy gums and no jaundice; hæmic murmur with no other abnormality in the heart and the lungs. Liver and spleen—not palpable, pulse 120 p. m. with small volume and low tension. Respiration 34 p. m., laboured breathing; temperature 90°·2F.; blood pressure 90/65 mm. of mercury. Bowels had not moved for 2 days. The patient's condition was too serious to be subjected to a thorough gynæcological examination. A gentle examination with a Cusco bivalve speculum revealed a bleeding small cervical polyp. A firm vaginal gauze-plug promptly stopped the bleeding.

Besides this vaginal plug to stop the bleeding, she was, on admission, given morphine grain ¼ with atropine sulphate, grain 1/100 intramuscularly followed by 100 c.c. of 25 per cent glucose solution. She was put on oxygen inhalation and also given 540 c.c. of Plasmosan by intravenous drip at 60 drops per minute Cardiazol, 1 c.c. I.M., 4-hourly. The patient was kept warm with blankets and the foot-end of the bed was raised 12 inches. The bleeding was found to have stopped completely when the plug was removed the next day.

Blood examination, on admission showed: R.B.C.—1·2 million per c.mm.; W.B.C.—5280/c.mm. with poly 73 per cent, mono. 2 per cent; lympho. 20 per cent and eosino. 5 per cent. The blood film showed poikilocytosis and anisocytosis with dimorphic character of the R.B.C.'s. A few nucleated R.B.C.'s were present. Urine and stool examinations showed nothing abnormal.

The patient was put on good nourishing diet and anti-anæmic treatment with ferrous iron (gr. iv, t.d.p.c.), injections of liver extract with vitamins B and C, and multivitamin tablets. In addition, the patient received three transfusions of whole blood, 300 c.c. each. The first transfusion was given on 20-6-52 followed by appreciable improvement in general condition when she was put up for a diagnostic curettage and removal of the cervical polyp on 25-6-52. Examination

under anæsthesia, just before the operation showed the uterus to be retroverted with a hard swelling from the front of the cervix which was then presumed to be an anterior cervical fibroid. The curettings showed nothing abnormal on microscopic examination and the cervical polyp was found to be a mucous one. The vaginal bleeding diminished to a great extent but did not entirely stop after the operation.

A second blood transfusion was given on 28-6-52. While recovering slowly, the patient had another bout of moderate bleeding on 16-7-52 when it was decided to put her up for a quick abdominal hysterectomy without further delay.

On 19-7-52 a total abdominal hysterectomy was performed by Dr. R. Sinha under open ether anæsthesia and with a blood transfusion during the operation. The patient subsequently made a steady uneventful recovery and was discharged from hospital on 3-8-52.

The first impression about the structural abnormality of the uterus was obtained during the operation by the fact that, what was considered to be an anterior cervical fibroid from the previous vaginal examination, was now actually found to be the anteverted uterus itself, and also that what was previously thought to be a retroverted uterus (and also duly curetted) now appeared to be looking like a subserous fibroid growing posteriorly from near the isthmus. Both the tubes, round ligaments and ovarian ligaments were duly attached to the cornua of the anteverted uterus. The uterus, after removal at operation, revealed the following features:

Single common cervix. There appeared to be two separate bodies of uteri, of almost equal size, their cavities communicating with the common cervical canal; but only one of these "corpus uteri" had both sides' tubes, ovaries and round ligaments while the other had none. The "corpus uteri" with the cornual appendages was only slightly bigger than the other one. The picture of the uterus after removal. (Fig. 1) shows these points clearly. Two uterine sounds are passed through the common cervical canal and led out of each "corpus uteri" through a "window" cut in its wall. The artery forceps are attached to the two sets of cornual structures of one "corpus uteri". A sketch of the specimen shows the structural details (Fig. 2) more clearly.

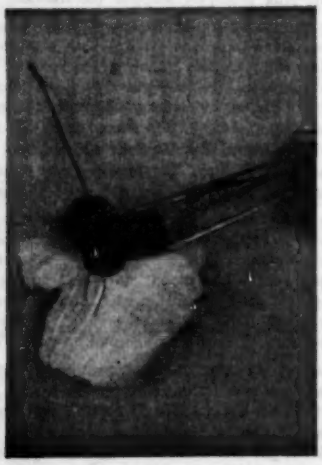

FIG. 1—SHOWING THE UTERUS AFTER REMOVAL

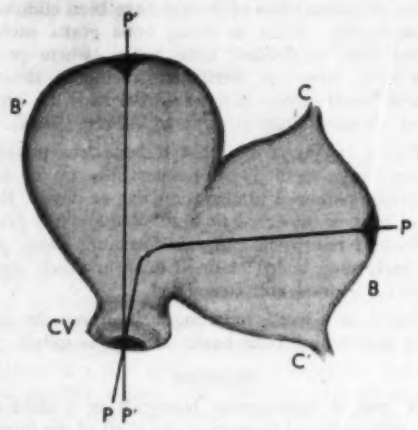


FIG. 2—SKETCH OF THE UTERUS REMOVED

PP—Probe inside the normal uterine cavity. P'P'—Probe inside the cavity of one of the "corpus uteri" (unusual part). CV—Cervix (common). CC'—Cornual structures. B—Body of the normal uterus. B'—Body of the abnormal part of the "corpus uteri."

## INTERESTING POINTS

1. The developmental anomaly does not conform to any of the usual types described in text books. The "additional" uterine body was almost the same size as the "normal" body of the uterus and connected to it not near the fundus but at the isthmus.

2. There had not been any interference with the functions of menstruation and reproduction throughout the life of the patient.

3. Apparently both the "bodies" of uterus had been functioning well. Even the curetting materials were obtained not from the "body" with the appendages but from the accessory one which then appeared to be in direct continuity with the vagina and cervix.

4. This interesting abnormality would have gone undetected if the uterus had not been removed, the removal being necessitated for the bleeding—probably of "metropathia" type.

ACKNOWLEDGMENT

I express my sincere gratitude to my chief, Dr. R. Sinha, Visiting Surgeon, for his kind encouragement and guidance, and to the Superintendent, Calcutta National Medical College Hospital, for permission to report this case.

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CALCUTTA, JUNE, 1953

## RURAL MEDICAL CARE

Provision of medical care for the rural population of this vast country of ours is a problem almost incapable for an easy and early solution. In every State of India the villages, particularly the remote ones, are almost unapproachable due to lack of communicatcns. Consequently these are lying most undeveloped and entirely dependent on the poor natural resources of the land. Formerly the land yielded enough crop for the maintenance of the limited population whose main avocation was agriculture and some cottage industries. But with the process of time, the population has increased by leaps and bounds causing complications of diverse nature.

Failing to get the requisite quantity of foodgrains from the available land in their possession, villagers are now being compelled to migrate to big cities and industrial areas to earn their living. Unused to such congested atmosphere and rather artificial surroundings, these unfortunate people easily get attacked with pulmonary tuberculosis and other diseases which are very common in congested and unhygienic localities. With these infections they return to their villages and help in the dissemination of such diseases which were not known in these surroundings.

Rural areas in most places are notorious for a very high incidence of malaria. Due to lack of pure drinking water many of the water-borne diseases like cholera are also seen to appear at places some of which are known to be endemic. In the absence of proper protection on a mass scale, smallpox also breaks out in epidemic form at times.

The economic backwardness of the people in general of the rural areas did not attract qualified medical practitioners to settle in larger numbers in the villages to look after them in sickness and infuse in them security measures for healthy living, although cities have more doctors than they really need.

Some of the local self-governing institutions, viz., municipalities, district boards, union boards, taluka boards and village panchayets have set up small charitable dispensaries either of the modern scientific, homœopathic, ayurvedic and unani systems for the rural population. The number of such dispensaries, however, is not very large. In some of the States of India attempts were made to subsidise doctors with an initial financial assistance and monthly grants to settle in the rural areas. Our experience however is that these measures did not achieve the amount of success which was aimed at.

After the transfer of power to people's representatives in 1947, all the States have instituted Health Ministries to look after the medical care, and provisions for preventive measures for the people at large have been made. Rural areas which were hitherto neglected began to receive attention from the different State Governments. Administrative units of medical relief and public health were amalgamated at the top level in most of the States and at the Centre. Arrangements for starting hospitals and treatment centres in the rural areas under the auspices of the Government received priority in the programme of national reconstruction.

The Community Development Projects that are now taking practical shape in India have given special importance to the starting of rural hospitals and subsidiary centres in each project area. In addition to medical officers, public health staff are posted to these rural centres to carry on protective inoculation to the masses, examine the health of all school-going children, give instructions to expectant and nursing mothers as to the care they should have, by lady health visitors and midwives specially trained for this kind of work. The medical officers visit the villagers and give them regular talks on the preventive aspects of medical care.

Besides the Community Development Project areas, the West Bengal Government, as revealed in an interpellation in the Legislative Assembly Session, have started till 30th April, 1953, 146 Rural Health Centres with provision of nearly 2,100 beds—all in rural areas. Each centre has been provided with living quarters for medical, health and nursing staff with liberal supply of pure drinking water from deep tube-wells. All the workers under the leadership of the Medical Officer in charge deploy themselves in villages in their charge in units of about 10 to 15 and carry on systematic propaganda regarding the mode of healthy living. The target figure for such health centres is 2,000 in this State.

Other States are also on the move to improve arrangements for the rural health care and almost every State with the resources at its disposal is planning for provision of better amenities to the people. Some of the States, of course, are seriously contemplating to utilise the votaries of indigenous school of medicine in the scheme for providing medical relief in the countryside on an extended scale.

It appears to us that during the last 200 years of research and progress, medical treatment of the modern scientific thought has established a strong foothold all over the country. Modern trends of treatment particularly in the realms of surgery, obstetrics and gynæcology have received tremendous ovation in mitigating human suffering. Discovery of antibiotics and their successful application in combating some of the diseases have made such magnificent strides that there should be cautious consideration about the claims

of the other schools of medicine in relieving the suffering of mankind in preference to modern scientific medicine.

We feel that whatever might have been the experience of the past the villages should no longer be kept neglected and all possible arrangements to provide scientific medical relief as well as insurance against poverty and preventable diseases should be introduced on well planned basis without any further loss of time. Mere provision of amenities for the city population keeping their counterpart living in the surrounding villages without proper medical care will never solve the perennial problem of the ill-health of the average population. It is a matter of some relief that with the willing co-operation of the various international organisations, our country is marching ahead to utilise all the available local and extraneous resources to fight against some of the very common diseases like malaria, tuberculosis, cholera and children's diseases. Centres for work have been distributed not only in the cities but also in the remote villages. We hope that in the fullness of time, sooner rather than later, we will see the basic principles of positive health for the common people of this vast land laid on solid foundations.

## IN MEMORIAM—DR. A. K. SEN

The sad and sudden death of Dr. Anil Kumar Sen, the erstwhile senior vice-president of our association, removes from our midst a man of uncommon abilities, social and economic insight, integrity of purpose and absolute honesty.

After graduating from the Calcutta Medical College in 1923, he did not take to medical practice as a career but decided to devote his life and energy to the growth and development of the drug industry of our country. He felt that unless the drug industry is developed on the right lines, there would not be any real relief to the ailing public, the majority of whom was very poor. With this mission he came into close association with the drug industry of Calcutta and held responsible offices in some of the leading drug manufacturing firms. His notable contribution in throwing out the original Import of Drugs Bill and the passage of the Drugs Act in the present form in 1940 may not have been known by many but as a member of the Drugs Technical Advisory Board since 1942 his services were very widely appreciated. Dr. Sen was also a member of the Pharmaceutical Enquiry Committee formed only lately to enquire into the quality and condition of the drugs manufactured in this country. His fight against spurious drugs is too well known to need mention.

Dr. Sen joined the Indian Medical Association from its inception in 1928. He was a member of the Journal Committee of I.M.A. from 1933 to 1941 and held the office of the Hony. Secretary of the Journal from 1934 till the end of December 1941. He served on the committee again in 1949-50. Dr. Sen was also on the Editorial Committee of "Your Health" from its inception in 1952. He was elected president of the Calcutta Branch, vice-president of the Bengal Provincial Branch I.M.A., a vice-president and then the senior vice-president of the I.M.A. only a year back. He rose to eminence in the Indian Medical Association because of his sincere and earnest zeal to elevate the position of the organisation to its maximum usefulness. He was rarely absent from any deliberation of the association and never failed to attend the Working Committee and Central Council meetings of the I.M.A. and the annual All-India Medical Conferences.

Dr. Sen was from his early youth connected with social and cultural organisations.

He took active interest in the Calcutta Deaf and Dumb School and as a member of the Managing Committee helped in its reorganisation. He was associated with the Royal Asiatic Society and took a leading part in the reorganisation of its various departments. He showed also a keen interest in the 19th century Bengali Literature and used to glean materials perhaps to present them before the public in the form of a thesis. But this remained unfinished due to his untimely death.

Dr. Sen was a man of stern self-respect and of strong principles. He never swerved from his ideals. He had a peculiar humour which could overcome all feelings of acrimony that might otherwise arise during heated discussions. There was a dignity of greatness about him and he presented an orderly process of thought capable of producing wise decision. We are happy that his professional and personal merits were well appreciated during his lifetime.

Our loss is a personal one as we had the privilege to work with him in a team. His invaluable services for the stability of the Journal served as a definite source of inspiration to us and on many occasions his wise counsel did place before us the right lead to solve many intricate problems we were faced with. It is really unfortunate that such a useful life was cut short when the country and its drug industry began to look up to him for proper guidance for stability.

Let his lofty ideals guide us all in our service to the profession through the organisation of ours.

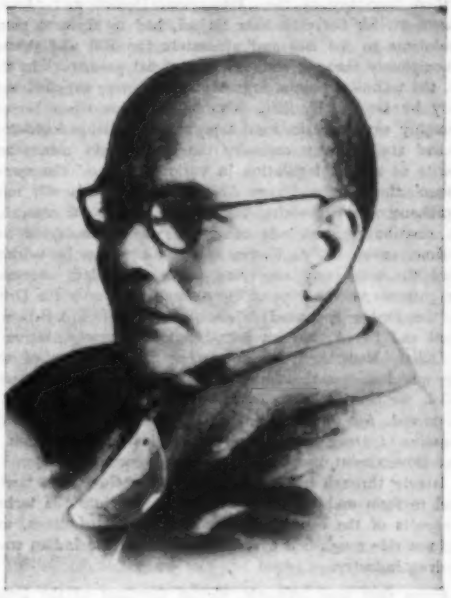
We offer our heart-felt condolence to the bereaved members of his family.

# DR. A. K. SEN—
# AN APPRECIATION (WITH REMINISCENCES)

B. MUKERJI,

*Director, Central Drug Research Institute, Lucknow*

The news of the sudden death of Dr. A. K. Sen, Senior Vice-President, Indian Medical Association, Member of the Drugs Technical Advisory Board, Government of India (Ministry of Health), Member of the Pharmaceutical Enquiry Committee, Government of India (Ministry of Commerce), and one of the Managing Directors of the Indian Health Institute and Laboratory, Ltd., came as a great shock to many of his friends and admirers all over India. Dr. A. K. Sen was barely 53 and was apparently in sound health when the cold hand of death suddenly snatched him away. The writer had the privilege of having him as his guest in Lucknow, from the 13th to 16th March, 1953, and at that time he was apparently healthy and could move about the whole evening after a strenuous day-meeting with the members of the All-India Chemists and Druggists Federation. Later he contacted Dr. A. K. Sen in Calcutta on the phone on the 23rd March and there was nothing evident from his tone that he had any malady worth noticing. On the 11th April, the news of Dr. Sen's death was brought to him by a friend in Bombay and on his return to Lucknow, he got confirmatory notes from his friends in Calcutta. Dr. Sen apparently died from the effects of a coronary attack, a condition which is claiming more and more victims these days both in Europe and in this country. There is nothing known yet as to the true cause of this condition.



DR. A. K. SEN

BORN 30-12-1899. DIED 9-4-1953.

Dr. A. K. Sen was one of the very few medical men who was not lured by private medical practice and took up laboratory work from the very beginning of his career. He graduated in 1923 at a time when there was still quite a lot of room for lucrative professional work, but he had been essentially of 'laboratory temperament.' After working for some time in the Clinical Diagnostic Service Field, he made himself well known as an accurate worker in bacteriology and serology. When the Bengal Chemical and Pharmaceutical Works, Ltd., started their first 'Biological Products' Laboratory, Dr. A. K. Sen joined there with Dr. H. Ghosh and together built up the fine 'Biological Products' Section which is now producing almost all the sera, vaccines, etc., necessary for modern therapy. Previous to this, the only firm in Bengal, which was producing sera and vaccines was the Bengal Immunity Company. Dr. A. K. Sen was associated with the Bengal Chemical & Pharmaceutical Works for many years and there he built up a reputation as a sound laboratory worker with specialisation in the field of immunology and bacteriology. Later he moved over for some time to the Birla Laboratories, and from there he migrated to the Indian Health Institute and Laboratory with which he was associated until his death.

The writer came in touch with Dr. A. K. Sen towards the end of 1937 in a meeting of the Executive Committee of the Bengal Pharmaceutical Association. Dr. A. K. Sen bombarded him with so many difficult questions on Association organisational matters that there was a tough fight on matters of principle which resulted in the resignation of the writer from the General Secretaryship of that body. Since that time, on many platforms, in the Indian Medical Association, in sub-committee meetings of the Drugs Technical Advisory Board and in many other meetings of an institutional or public level, there had been hardly any occasion when there was not a fight between the writer and Dr. A. K. Sen on matters pertaining to reform of Drugs and Pharmacy. There was really no enmity between the two, but Dr. A. K. Sen apparently had an idea that the writer, being a Government man, was out to kill the Drug Industry by the promulgation of governmental measures.

At that time the writer was associated with Sir Ram Nath Chopra, who was the Chief at the Biochemical Standardisation Laboratory, and he was pulling all his weight with Sir Ram Nath to see that the Drugs Act and Pharmacy Act were put on the Statute Book as early as possible. The recommendations for these were made earlier by Sir Ram Nath Chopra, as Chairman of the Drugs Enquiry Committee of the Government of India, which was convened in 1930-31. In 1939, the Government of India in the Ministry of Health put up before the Assembly the first 'Import of Drugs Bill'. This Bill was designed to control only the *import* of drugs and made no provision for the control of 'manufacture, storage, distribution and sale' of drugs. In general it was felt that this was a half-hearted measure which had been put up by the Government to hoodwink the public and the Indian Manufacturing Industry was strongly opposed to it. The fight against the Bill was launched chiefly by Messrs. Bengal Chemical & Pharmaceutical Works and Alembic Chemical Works, Baroda. At this time, the late Shri Jagadindra Lahiri (then Manager, B. C. P. W. & Co.) and Dr. A. K. Sen went to Delhi and did all the lobby work that was necessary to counteract the measure on the floor of the House. Through the help of Pandit Laxmi Kanta Maitra, who is still a member of the present Parliament, and others, very intensive opposition to this Bill was put up and

the then Secretary of the Education, Health and Lands Department, Sir Girja Shanker Bajpai, had to agree to many amendments to the Bill and ultimately the Bill was thrown out completely through conjoint non-official pressure. In this fight, the technical points, arguments, etc., were supplied very largely by Dr. A. K. Sen, who had by this time become thoroughly versed in the legal aspects of the Drugs legislation and had studied very carefully the comparative merits and demerits of such a legislation in various parts of the world. In 1940, the present Drugs Act, which was a much more comprehensive act covering all aspects of import, manufacture, distribution and sale of drugs, was promulgated and this time, again, Dr. A. K. Sen helped its passage by working behind the scene and supplying the various data necessary for arguments on the floor of the Assembly. Under the Drugs Act, the Drugs Technical Advisory Board (D.T.A.B.) was formed and Dr. A. K. Sen joined this as a representative of the Indian Medical Association. The first meeting of this body was held on the 2nd and 3rd November, 1942, with Lt.-Col. Sir Gordon Jolly as Chairman. In this meeting Dr. Sen proved, for the first time, his wide knowledge of the intricacies of Drug Legislation and carried the opposition to many Government proposals in a very effective manner. It was largely through his leadership that the Government were forced to form many 'Sub-committees' to go into the technical aspects of the control and standardisation of drugs, and could not ride roughshod over the interests of the Indian trade and drug industry.

From that time onwards, eleven meetings of the Drugs Technical Advisory Board were held, in six of which the writer was present as a Member and in others as an Adviser to the Government. Dr. Sen's trenchant criticisms and thorough mastery of the Act and Rules made it extremely difficult for the Government spokesmen to keep their points of view, and on many occasions, amendments, modifications and alterations had to be done on well organised moves from the Government side on the strength of the opposition which was carried mostly by Dr. A. K. Sen. During many of these meetings and intensive fights on points and counter-points, an attitude of tolerance and understanding grew between the writer and Dr. A. K. Sen. It later on developed into a friendship and a respect for each other's viewpoint. Dr. A. K. Sen's attitude in most of these meetings was always critical and he was a very hard man to be convinced. Deeply versed in parliamentary debates and tactics, with a keen sense of finding loopholes in the various statements issued from the Governmental Benches, and with a very incisive sense of humour, he was easily the most dreaded individual in the Drugs Technical Advisory Board. One thing was always noticeable, and that when Dr. A. K. Sen could be cornered by anybody, he would fight and fight well but if the technical side of the answer was correct, he had the generosity to accept it. And, because of this, as years rolled on, the members of the D.T.A.B. became more and more impressed with his sincerity of purpose and began to respect his points of view, even though these were not generally palatable. The first Secretary of the D.T.A.B., Mr. A. F. MacClloh, considered Dr. A. K. Sen as a strong opposite member, but to-day, the present Secretary, Mr. P. M. Nabar, feels that he was one of the most constructive men in the D.T.A.B., and he was always keen to take full note of Dr. Sen's arguments before taking any decision in a controversial point.

The Drug Reform Movement in India, initiated by Sir Ram Nath Chopra, and actively kept up by the undersigned, received its greatest help from the legal-cum-scientific mind of Dr. A. K. Sen, and all those interested in seeing the enactment of the right type of Drug Rules in India would agree that Dr. A. K. Sen made one of the most significant contributions to this work during his life time. His activities in the Indian Medical Association were also worthy of note, but the writer is unaware of the many-sided services which he rendered to that body. From official, public and personal contacts with Dr. A. K. Sen, one got an impression that there would hardly be any other medical man with so much keen sense of legal formalities, so much ready wit and humour and so much of constructive ideas in setting up and running an administrative machinery for the improvement of drug standards and quality. There have been many outstanding medical men in professional fields. Dr. A. K. Sen cannot be bracketed in that group. However, few medical men can claim to have contributed to India's Drug and Pharmacy Reform Movement in a way similar to that of Dr. A. K. Sen. He was by no means a successful medical man according to modern yardstick, but in spheres where influence of medical men is hardly felt, he blazed a new trail and showed that medical men could also think of things other than purely professional work. He could not be considered to have attained any great height in the field of medical research, but on many occasions, the writer was pleasantly surprised to find the depth of knowledge, the vast amount of study that Dr. A. K. Sen had in the field of early development and growth of scientific medicine in this country. He had a hobby of going through old books on medicine and public health in the Royal Asiatic Society of Bengal (now Asiatic Society), and he also kept up elaborate notes of most of the things he studied. By nature, he was a debator and was not normally prepared to give his adversary his dues, but when he was engaged in a real discussion and in many technical sub-committees, one could see that the man had an open mind and was prepared to accept things which could be proved by data and references. These were the channels through which the writer gradually got over Dr. A. K. Sen and together, they could improve the present Drugs Act and Rules in a manner which makes it one of the most progressive legislative enactments of this type. In official and non-official circles, pertaining to Drugs and Pharmaceutical Industry, perhaps very few had an opportunity of such intimate contacts with Dr. A. K. Sen as the writer had and it is only meet and proper that he should record his impressions of a man who was often misjudged by many as an 'obstructionist.' He was an idealist in matters of form and procedure and he was unwilling to side with those who wanted to support irregularities knowingly and unknowingly.

Dr. A. K. Sen had a pleasant personality, a sense of punctuality and discipline which he maintained to the very last. He was fearless in his criticism even with the highest in office and had the leadership to make his colleagues agree with him. Where voting was taken, he had lost on many occasions, but he succeeded in leaving a lasting impression on others that he would not budge an inch when the question of principle was concerned and when it was necessary to support the cause of the Indian Drug Industry and Trade against outside influences.

The writer is very grateful to Dr. P. K. Guha, for his requesting him to write a note about Dr. A. K. Sen, which he is doing with greatest pleasure, and as a mark of tribute by a colleague to another medical scientist who was worthy of his highest regard.

# CURRENT MEDICAL LITERATURE

### Acute Cardiac Infarction Without Pain

Papp (*Brit. Heart J.*, **14**: 250, 1952) writes that acute cardiac infarction without pain is rare. In 150 cases in which coronary thrombosis with electrocardiographic signs of acute cardiac ischæmia was diagnosed, the author found seven patients in whom pain was completely absent, and in an eighth patient slight pain was present for a short time only. Three of the eight patients had congestive heart failure with cardiac infarction. Two died and at necropsy were found to have extensive arteriosclerotic heart disease with occlusion of more than one main coronary artery. The third, who survived, had a slight cardiac infarction during an attack of cardiac asthma. Acute paroxysmal dyspnœa was the main symptom in all; this may overshadow coronary pain. Five patients had complete heart block during the attack. Four of them had no pain; in the fifth, who had intermittent heart block, pain appeared when normal rhythm was restored. Complete heart block was recorded in four, and lasted from one and a half hours to one week or more. The electrocardiogram indicated posterior infarction in three, anteroseptal infarction with right bundle branch block and later left bundle branch block in one, and anteroposterior infarction in one. All patients recovered; one had a small anterolateral infarction accompanied by pain, but not by heart block, 18 years later, from which he also recovered. Faintness with a pulse rate of 30 to 40 was the main clinical symptom, but complete loss of consciousness occurred only in one patient. These attacks differ from classical Stokes-Adams attacks in that ventricular standstill, ventricular tachycardia, and therefore complete loss of consciousness may be absent. Sudden fall of pulse rate accompanied by fall of blood pressure, as it occurs in complete heart block during acute cardiac infarction, may induce incomplete cerebral anoxæmia; this causes faintness without loss of consciousness, but with loss of sense of pain. Prognosis is serious in cardiac infarction without pain and complicating heart failure; with complete heart block it may be less serious than is generally accepted, since transient block may be a sign of only temporary ischæmia of the conducting system.

### Functional Heart Disturbances

Master (*J.A.M.A.*, **150**: 195, 1952) gives in the following lines the summary of his observations on a study of 1,000 consecutive private cardiac patients:

In referring to heart conditions in patients who show no organic lesion, the expression functional "disturbance" is preferable to functional "disease".

The frequency and magnitude of the problem of functional heart disturbances need emphasis. Of 1,000 consecutively examined patients in consultation practice, 382 were found to be suffering from functional "disturbances" of the heart. Since the beginning of this study it has been possible to follow up these cases for from three to five years and to confirm the established diagnosis.

Of the 382 patients, 289 were male and 93 female, a ratio of 3 to 1. The majority were under 50 years age, whereas the majority of patients with arteriosclerotic heart disease are over 50.

Pain or pressure in the chest was the most common condition. It affected 243 (64 per cent) of the patients, occurring alone in 171 and in conjunction with other functional disturbances in 72 others. Occasionally the chest pain was indistinguishable from that of coronary disease; it was substernal in location, radiated down the left arm, was precipitated by effort, and was relieved by nitroglycerin. Conversely, the pain in organic heart disease was occasionally atypical. Any chest pain unrelieved by nitroglycerin was usually not caused by coronary artery disease, although there were a few exceptions to this rule.

In general, the symptoms found in functional cardiac states are very similar to those encountered in organic heart disease. This applies particularly to shortness of breath and to palpitation.

Paroxysmal tachycardia was found in 50 patients, premature beats in 18, neurocirculatory asthenia in 48, anxiety neurosis in 13, hypertension in 17, and murmurs in 12. Fifty-three of the patients were classified in a miscellaneous group. There was a frequent overlapping of the diagnoses.

Chest pain was present in 42 per cent of the patients with paroxysmal tachycardia. There was no definite instance of paroxysmal ventricular tachycardia.

Approximately 60 per cent of the patients with either neurocirculatory asthenia or anxiety neurosis complained of pain or pressure in the chest.

The hypertension found was usually very mild. In seven instances the readings were high enough to be considered hypertensive even in accordance with the newly accepted higher limits of all these patients.

The functional murmurs were all systolic in time. In no instance was a grade 3 murmurs found.

Among the miscellaneous group, a misinterpretation of the electrocardiogram was not infrequent. Sighing was often mistaken for shortness of breath by the patients.

The treatment of functional disturbances of the heart is very often unsuccessful. Recognition of their frequent occurrence will, it is hoped, lead to extensive research into the cause of these disturbances and to the discovery of methods for their prophylaxis and treatment.

### Hepatic Fibrosis in Cardiac Disease

Moschowitz (*Ann. Int. Med.*, **36**: 933, 1952) prefers the term fibrosis to cirrhosis, and points out that there are widely differing opinions concerning the morphology and pathogenesis of hepatic lesions associated with cardiac disease. The earliest phase in the development of this condition is that characterized by what is usually referred to as "nutmeg" liver, in which there is dilatation of the central sinusoids with trabecular narrowing. Later, centrolobular necrosis ensues. Thereafter, the morphological changes depend on whether hypertension of the portal circulation is maintained long enough. This usually occurs in constrictive pericarditis, often in the terminal stages of tricuspid valve disease. That portal hypertension is maintained was shown by histological demonstration of "congestive splenomegaly". Under such circumstances, various forms of fibrosis occur: first, capillary sclerosis around the central veins; second, organization of the centrolobular necrotic areas with the development of new central veins in these fibrotic areas, either by autochthonous formation of capillaries or by direct sprouts from the terminal branches of the portal vein in the interlobular septa; and third, by sclerosis of the hepatic veins and the immediately adjacent parenchyma. The periportal fibrosis that has been described as occurring in "cardiac cirrhosis" bears no resemblance to that observed in true Laennec's cirrhosis. Cardiac fibrosis is not a replacement fibrosis but is an active and proliferative process. New capillary shunts or short circuits are developed simultaneously. There are four kinds of such shunts: first, between the terminations of the portal vein and the central vein in the interlobular

septa; second, by newly formed capillaries that bud from the terminal branches of the portal veins within the portal septa to the central veins; third, by budding from the preexisting portal branches in the interlobular septa to the newly formed central veins; and fourth, by direct capillary communication between the terminations of the portal veins in the interlobular septa and the hepatic veins. These shunts are compensatory mechanisms to help equalize the pressures between the portal vein and the hepatic veins. Evidence is submitted that the morphological changes of cardiac fibrosis are the result of portal hypertension of central origin. Advanced hepatic cirrhosis may be suspected if there is constrictive pericarditis of long duration, persistent and recurring ascites, increased peripheral venous pressure, splenomegaly, and enlargement of right auricle and ventricle, and dilatation of the pulmonary artery.

### Cerebral Lesions in Congenital Heart Disease

Berthrong and Sabiston (*Bull. Johns Hopkins Hosp.*, **89**: 384, 1951) from the analysis of a study made on 162 autopsies of patients with congenital heart disease, 135 of the cyanotic type and 27 of the acyanotic type observe:

Cerebral infarctions were found in 25 of the 135 autopsies on patients with cyanotic heart disease. Both arterial and venous thrombosis occurred. There were 62 cases of tetralogy of Fallot, of which 13 had cerebral infarctions. These did not show any greater increase in the degree of polycythemia than did the 49 cases without lesions. However, it is emphasized in cases with polycythemia, that any state which leads to increased polycythemia, to endothelial damage or to decreased blood flow may result in prompt intravascular thrombosis. Several mechanisms may have been responsible for the cerebral thrombosis: peripheral venous thrombosis which reaches the cerebral arteries as paradoxic emboli through cardiac defects, the development of thrombosis *in situ* in the cerebral arteries or embolization to the brain from mural thrombi in the cardiac chambers. An increase in hæmorrhagic infarction in the immediate postoperative period may have been due to an increase in platelet formation, shock, and hemoconcentration. Brain abscesses occurred in five patients, suggesting a greater frequency in cyanotic congenital heart disease.

In the 29 patients of the acyanotic group, cerebral lesions were present, but were usually not thrombotic in nature.

Ten of these patients had coarctation of the aorta; four had aneurysms of the circle of Willis; three of the four died of a massive subarachnoid hæmorrhage. There was one patient with a surgically cured patent ductus arteriosus who also died of a hæmorrhage secondary to a ruptured congenital aneurysm of the circle of Willis. One patient had a brain abscess secondary to an osteomyelitis.

### Pathogenesis of Malignant Hypertension

Pickering (*Circulation*, **6**: 599, 1952) gives in the following lines the summary of his observations:

The response of the body to raised arterial pressure includes cardiac hypertrophy and medial hypertrophy of the arteries. There is also some evidence that affections of the largest and moderate sized arteries, atheroma and elastosis, are more widespread and severe when the arterial pressure is raised for long periods. Provided the arterial pressure does not pass a certain critical level, these are the major consequences of hypertension, and on the whole they present a rather stable picture, except for the thrombotic occlusion of atheromatous coronary or cerebral arteries, and the accession of cardiac failure, which is not necessarily ischæmic in origin. This relatively stable picture in which the patient's condition remains unchanged often for many years is termed the benign phase of hypertension, and is most commonly seen in those types of hypertension in which the casual lesion is itself stable, particularly in essential hypertension and coarctation of the aorta, to a less extent in chronic pyelonephritis, polycystic kidney and Cushing's syndrome; it may also occur in chronic nephritis in which, however, the clinical course is often dominated by the nephritis lesion itself.

Should, however, the pressure rise above a certain cirtical value, which varies from one patient to another about an average of 140 mm. Hg. diastolic, then albuminuric retinitis is seen, and acute necroses occur in the arterioles of many organs, particularly of kidney, intestine, abdominal viscera, heart and brain. These acute necroses expand the wall at the expense of the lumen and seriously interfere with the blood flow to territories they supply. This is particularly important in the kidney and results in the appearance of albumin and red cells in the urine and progressive decline of renal function terminating in uræmia. The weakening of the arterial wall consequent on its necrosis is probably the chief cause of cerebral hæmorrhage that may also terminate the malignant phase. The great load imposed on the heart by the high pressure of malignant hypertension may also be held responsible for left ventricular failure, the third mode of death in this condition. The course of hypertension may change from benign to malignant in any disease in which the pressure rises above the critical level. Because essential hypertension is by far the commonest type, this provides the bulk of malignant hypertension, followed by chronic pyelonephritis, acute, subacute and chronic nephritis, polycystic kidneys, periateritis nodosa, Cushing's syndrome, pregnancy toxæmia, and possibly pheochromocytoma, in roughly that order. In coarctation it would seem that hypertension is never gross enough to produce the malignant phase. Once albuminuric retinitis has appeared or the malignant phase has been diagnosed, a persistent and considerable reduction of the arterial pressure becomes the single and urgent aim of therapeutics.

There has been in the past much argument as to when the term malignant hypertension should be used. In the light of the considerations discussed here much of this argument would seem spacious and irrelevant. The malignant phase has a reasonably precise implication for both prognosis and therapeutics and can complicate nearly any type of hypertension. It would therefore seem proper to speak as Fishberg does of the malignant phase of hypertension, but also to relate it to the underlying disease whether this be essential hypertension, pyelonephritis, pregnancy toxæmia, nephritis, polycystic kidney or the like. In this way, the name given by the doctor in his diagnosis is not only reasonably full and accurate, but prepares the way for the correct management of the case.

### Endocrine Factors in Hypertension

Perera (*Bull. New York Acad. Med.*, **28**: 43, 1952) discusses the relationship of the psyche, stress and steroids to the production of hypertensive vascular disease, and points out that these factors may be related to various substances elaborated by endocrine glands. Certain endocrine secretions —epinephrine, norepinephrine, desoxycorticosterone and cortisone—have been shown to possess pressor qualities, but there is no definite proof of endocrine dysfunction in the ætiology or subsequent course of hypertensive vascular disease.

These hormones probably modify rather than initiate basic metabolic processes. In renal hypertension, pressor substances which are normally excreted may be retained, and in other cases unknown metabolites may sensitize blood vessels to normal amounts of hormone. Despite recent advances and theories, the problem of hypertensive disease still contains many unanswered questions.

### A Neglected Roentgenologic Sign of Coarctation of the Aorta

Bruwer and Pugh (*Proc. Staff Meet. Mayo Clin.*, **27**: 377, 1952) write that rib notching is still the most important roentgenologic sign of coarctation of the aorta. It is a known fact that in about a third of the cases of coarctation of the aorta in which operation was performed at the Clinic, another valuable sign was present on the postero-anterior rœntgenogram. This consisted of a notch in the left border of the descending aorta just above the level of the left main pulmonary artery. This notch represents the coarctate segment. It may be present to markedly varying degree, depending on a number of factors discussed. In about 5 per cent of our cases, the notch was the only definite rœntgenographic sign of coarctation in the postero-anterior rœntgenogram.

### Antagonism of Anticoagulants by Vitamin $K_1$

Toothey (*Brit. M. J.*, **2**: 687, 1952) writes that it is apparent that vitamin $K_1$ is most effective in overcoming the prothrombin deficiency induced by such drugs as dicoumarol, tromexan, and phenylindandione. Even with very severe deficiencies, resulting in prothrombin levels of below 10 per cent for several days, an oral dose of 500 mgm. of vitamin K, will restore the prothrombin time to a safe level within eight hours, the effect being evident within four hours. The effect was also noticed even when congestive failure was present.

In three cases with frank hæmorrhagic manifestations vitamin $K_1$ stopped bleeding within a few hours, and no transfusions were necessary.

When very large doses of dicoumarol (and to a lesser extent phenylindandione) have been given, with consequent storage of the drug in the body, repeated doses of vitamin $K_1$ may be needed to prevent a further rise in the prothrombin times—'rebound phenomenon.' This effect does not occur with tromexan owing to the rapidity of excretion of the drug.

Comparison of the effect of water-soluble preparations of vitamin K with that of vitamin $K_1$ leaves no doubt that the latter should be the drug of choice when it is essential to overcome severe prothrombin deficiency, particularly if bleeding is present. In the latter event, unless there are also signs of shock due to the lack of blood, it should not be necessary to resort to blood transfusions. The availability of vitamin $K_1$ should widen the scope of anticoagulant therapy with dicoumoral and allied drugs, so long as it is remembered that prothrombin estimations are essential for their control. The possibility of an urgent operation being necessary in a patient on dicoumarol or allied drugs has always been a drawback to their use. This drawback is largely overcome by the use of vitamin $K_1$.

### Intrahepatic Obstructive Jaundice

The diagnostic problem in cases of non-hæmolytic jaundice may occasionally prove insoluble, despite help from liver-function tests. Since the treatment of bilary obstruction is essentially surgical, while that of parenchymal hepatitis is essentially medical, a correct solution is obviously important. A common cause of confusion is damage to the liver cells from long-continued biliary obstruction, so that clinical and laboratory signs of parenchymal liver damage come to overlie the original picture of obstruction. This is especially likely to happen when infection and inflammation arise in the obstructed biliary passages. Until recently less attention was paid to the opposite state of affairs, in which features of obstruction become dominant in subsequently proved cases of parenchymal hepatitis. Of 228 cases of hepatitis reported by Steigmann *et al.* (*Arch. Surg.*, **59**: 101, 1949) 65 at the time of admission showed evidence of severe interference with the bile-flow, such as a serum alkaline-phosphatase above 15 Bodansky units, a total serum-cholesterol above 300 mgm. per 100 ml., or a urinary urobilinogen content of less than 1 mgm. per 24 hours. The change underlying these obstructive phenomena is still uncertain; but Watson and Hoffbauer (*Ann. Int. Med.*, **25**: 195, 1946) have suggested that it may be excessive permeability of the cholangioles with the result that the bile will leak back into the circulation.

That intrahepatic cholangiolitis, due probably to a low-grade infection, can produce such a clinical picture is now usually agreed; but this should not cause the much commoner condition of biliary obstruction in the porta hepatis to be overlooked. Two cases reported by Billington (*Med. J. Australia*, **1**: 662, 1952) illustrate how easy it is to miss the diagnosis of this condition. The first case was in a man of 60 with a typically obstructive form of jaundice, in whom no extrahepatic lesion of the biliary ducts was detected despite two laparotomies. At necropsy about nine months after the onset of jaundice, no occluding lesion was found until section through the porta hepatis, which appeared normal from outside, revealed stenosis of the common hepatic duct due to an early duct carcinoma. In this case, owing to an anatomical variation from normal, the junction of the right and left hepatic ducts took place within the liver, and consequently quite a small intrahepatic neoplasm could interrupt the entire biliary outflow. In the second case, where the more usual arrangements of the duct system were present, an almost identical clinical picture was produced by an intrahepatic primary adenocarcinoma of the left hepatic duct with secondary biliary cirrhosis confined to the left lobe of the liver.

From these, and many other similar cases, it is evident that, in cases of obstructive jaundice, negative findings at a simple exploratory laparotomy cannot be taken to exclude a localised lesion in the duct system. Cholangiography at the time of operation seems to be the only means by which these cryptic obstructions might be recognised during life. Although radical extirpation would rarely be feasible, it is obviously unsatisfactory to relegate these cases to the group of idiopathic chloangiolitis until necropsy reveals the true state of affairs. *Lancet*, Ed. **1**: 1248, 1952.

### Smoking and Asthma

Peters and others (*Proc. Staff Meet. Mayo Clin.*, **27**: 329, 1952) write that no patient who has asthma should smoke. Smoke of any type is irritating, not soothing, to mucous membranes. Smoking induces cough, bronchitis and bronchospasm, which are nature's warning to avoid or to expel the irritating effects of smoke. Likewise, any temporary benefit that patients derive from smoking so-called asthma cigarettes or burning powders which contain stramonium or nitrates, is nullified by the deleterious effect of the smoke itself, which aggravates the patients' bronchitis. Most

asthmatic persons have considerable bronchitis, as evidenced by inflamed, red, swollen, mucous membranes, covered with protecting mucus, and associated with some degree of bronchospasm. Such inflamed membranes are extremely sensitive to such irritants as dust, smoke, fumes, cold air, and strong odors.

### Alkaptonuria: Report of 3 Cases

Martin and others (*Proc. Staff Meet. Mayo Clin.*, **27**: 193, 1952) write that the term "alkaptonuria" refers to a condition in which the urine darkens on standing or on addition of alkali. The substances in the urine which are responsible for this change are referred to as "alkapton bodies." Of these, homogentisic acid is the body responsible for spontaneous alkaptonuria. The term "ochronosis" refers to the metabolic condition which results in deposition of alkapton bodies in certain tissues.

Spontaneous alkaptonuria is an hereditary, familial and congenital anomaly of the metabolism of the amino acids, tyrosine and phenylalanine.

Alkaptonuria may be associated with no symptoms or secondary signs but, in severe or long-standing cases, it may induce ochronosis. The ochronosis may be apparent from pigmentation of the parts of the body where alkapton is deposited. The ochronosis may be asymptomatic or it may induce "ochronotic or alkaptonuric osteoarthritis". This is attributable to extensive degeneration of the joint cartilages from irritation caused by the foreign material. Thus, the clinical features of this metabolic error are summarized in the triad: dark urine, pigmentation and arthritis.

'Ocular ochronosis' is characterized by symmetrical, semilunar or V-shaped accumulations of brown or gray pigment in the sclera, midway between the margin of the cornea and the outer or inner canthus. It is specific in its location because it attacks the insertion of a rectus tendon. Deposits are particularly likely to be found in cartilaginous structures. The cartilage of the ear may be bluish black or grayish blue.

Greyish-blue staining of the fibrous tissues and tendons is best seen about the knuckles, knees and on the backs of the feet. The coloration of the knuckles is best seen when the patient makes a fist.

Brown or black pigment may be distributed on the nose and cheeks in the shape of a butterfly. The skin of the axilla is particularly likely to become coloured by deposits of homogentisic acid since this acid is excreted by the sudoriferous glands. Perspiration has been known to cause dark stains on the clothes. Rarely, there is brown pigmentation of the thenar and hypothenar eminences and of the nails.

The joints most often affected by ochronotic arthritis are those of the spinal column, shoulders, knees and hips. Clinically, this condition resembles somewhat rheumatoid arthritis; rœntgenographically it resembles osteoarthritis, but of a special and rather characteristic type.

The most charactertistic and distinguishing features of alkaptonuria are: (1) urinary straining of the diapers and underclothing; (2) a diagnosis of diabetes having been made at one time; (3) bluish discoloration of the cartilages of the ears and pigmentation of the scleræ; (4) confirmation of the presence of urinary homogentisic acid by means of Benedict's and Fishberg's tests; (5) rœntgenographic changes characteristic of ochronotic spondylitis. One or more of these features were present in each of the 3 cases which are reported.

### Pulmonary Resection for Tuberculosis

Takaro and others (*Proc. Staff Meet. Mayo Clin.*, **27**: 345, 1952) write:

Thirty-two pneumonectomies and 41 lobectomies were performed for tuberculosis and the patient's condition was followed for one year or longer. Four patients died in the first sixty days and 6 others died later of tuberculosis or other diseases. Ten additional patients had active disease at the time of the follow-up, leaving 53 patients with a satisfactory result.

The best results were obtained in those patients who had had tuberculosis less than five years, whose tubercle bacilli were sensitive to streptomycin, whose immediate post-operative bacteriologic cultures gave negative results, and who underwent thoracoplasty to prevent over-expansion of the remaining pulmonary tissue. The results did not seem to be related to the age or sex of the patient or to the presence or absence of rœntgenologic evidence of inactive disease in the contralateral lung. The indication for pulmonary resection may be of prognostic significance, but the number of cases was too small to make determination of this point possible.

### The Intravenous Use of Iron

Hagedorn (*Proc. Staff Meet. Mayo Clin.*, **27**: 277, 1952) writes that elemental iron given intravenously is almost quantitatively utilized for the formation of new hæmoglobin in anæmia caused by deficiency in iron. The rapidity with which regeneration of hæmoglobin has occurred has been greater than in comparable cases in which treatment has consisted of the oral use of iron. However, no doubt exists that reactions of toxicity occur after intravenous use of saccharated iron oxide, although in the experience at the Clinic they have been mild and insignificant. No fatal reactions at any dosage level have been reported. When 100 to 200 mgm. of elemental iron are given, reactions have occurred infrequently. These reactions of toxicity have consisted of local inflammation when the preparation has been injected paravenously, and flushing of the face, nausea, headache and abdominal pain when the injection has been too rapid. Aching and stiffness in the back and extremities, nausea and abdominal cramps have been noted as a delayed reaction three to five hours after injection. A transient decrease in the number of circulating granulocytes lasting five to ten minutes has been noted immediately after injection by one observer. In none of the cases at the Clinic have reactions been of such character to prevent the patient from receiving willingly further administration of the drug. Usually this has been accomplished without further difficulty.

These studies are reassuring but it is still possible that excessive deposits of iron during a period of years could produce damage to tissues. Therefore, care is necessary in the intravenous administration of iron. It should be given only to patients who have anæmia caused by deficiency in iron and in doses calculated to restore only the deficit of hæmoglobin and the depleted stores of iron.

The indications for the intravenous use of iron are: (1) uncomplicated anæmia caused by deficiency in iron that has been unresponsive to prolonged periods of adequate oral administration of iron; (2) intolerance to iron given orally; (3) allergy or sensitivity to oral administration or iron (a rare situation) when desensitivity may be accomplished by iron given intravenously; (4) anæmia caused by deficiency in iron discovered so late in pregnancy that there may not be time for the administration of adequate amounts of iron by mouth and (5) severe hæmorrhage in patients in whom transfusions are prohibited for religious reasons.

### Use of Diuretic Agents

Schroeder (*J.A.M.A.*, **147**: 1109, 1951) approaches the problem of diuretic agents both by means of a table and a text discussion of individual effects of various agents. He explains the diuretic effect of water, alcohol, osmotic diuretics, neutral substances, plasma oncotic affectors, xanthines, mercurials (both with and without theophylline), digitalis, thyroid and parathyroid substances.

Water is to be principally used in the individual who is dehydrated and has high electrolyte content in his blood. Alcohol is indicated in overhydration. Normal saline solution is useful in dehydration with normal electrolytes. Concentrated salt solution is used in overhydration with low electrolytes. Potassium salts are useful in œdema with normal electrolytes. Urea and acidifying salts are used in œdema where fair to good renal reserve is present. The plasma oncotic affectors (serum albumin) are used in cases with hypoproteinæmia. Xanthines, chiefly theophylline, are used in œdema with normal electrolytes and they should be used with caution where cardiac arrhythmias are present. The mercurial diuretics are used where there is œdema with normal electrolytes and fair renal reserve. Mercurials containing theophylline should be used with caution if cardiac arrhythmias are present and the diuretic is given by parenteral means. Digitalis is useful in œdema due to myocardial failure and acts by improving the efficiency of the myocardium.

Schroeder points out that the best results with diuretics are obtained when one first determines the cause of the œdema and then elects the proper diuretic to remove it.

### Oral Crystalline Penicillin G in Megaloblastic Anæmia in Africans

Toy and others (*Lancet*, **1**: 1221, 1952) write that the megaloblastic anæmias which respond to intramuscular penicillin also respond to oral penicillin.

Alike with oral and with intramuscular penicillin, there seems to be an optimum dose above and below which no response can be obtained. In the cases investigated the optimum dose seemed to be 200,000 units daily for oral penicillin and 400,000 units daily for intramuscular.

Penicillin probably produces its effect by changing the intestinal microflora.

Large doses of penicillin destroy not only the competing flora but also the synthesising flora.

It is suggested that a low-protein high-carbohydrate diet produces a microflora inimical to the synthesis and/or utilisation of hæmopoietic factors. This may explain why the incidence of deficiency states related to vitamin-B complex are so common in Africa, India and the Balkans.

### Fatal Aplastic Anæmia after Chloramphenicol

Claydon and Holbrook (*J.A.M.A.*, **149**: 912, 1952) give in the following lines the summary of their observations on two cases of fatal aplastic anæmia following the use of chloramphenicol:

The patients were elderly but well-preserved persons who had no history of hay fever, asthma, or ingestion of other drugs containing a nitrobenzene radical. In case 1 the initial course of chloramphenicol was given in March, 1951, for four days; a subsequent course was prescribed in October and the ingestion of the medication was continued intermittently into November and December, 1951. Purpura appeared about two weeks later. In case 2 therapy was also begun in March, 1951. It was continued through April and terminated in May, 1951. Purpura did not appear until six weeks later. The onset of purpura in each instance was accompanied by granulocytopenia, leukopenia, thrombocytopenia, and anæmia, which gradually increased in severity. Transient clinical improvement followed administration of corticotropin (ACTH) and cortisone, which did not reduce the need for whole blood or prevent fatal hæmorrhages.

The authors maintain that careful evaluation should be made of the hæmatological status of candidates for chloramphenicol therapy, and the drug should not be prescribed when leucopenia or marrow hypoplasia are present. Patients receiving chloramphenicol should be followed with bi-weekly blood counts so that early signs of marrow injury may be discovered and the antibiotic discontinued while the capacity for effective hæmopoietic regeneration exists. Although chronically ill, debilitated, or aged patients seem more susceptible to the toxic action to this agent, no common denominator has yet been found. If self-administration and careless supervision of the use of chloramphenicol can be eliminated, this valuable and relatively nontoxic drug will attain its rightful place in our armamentarium.

### Vitamin Deficiencies Following Use of Antibiotics

The effect of an antibiotic on the vitamin elaborating intestinal bacteria depends entirely on the level of the antibiotic used. Many workers have reported a beneficial effect on growth and good utilization in experimental animals fed on rations containing small amounts of antibiotics. Others have found a moderating or sparing effect on the requirements for certain B complex vitamins, such as thiamine and vitamin $B_{12}$ (Antibiotics and B-Vitamin Requirements, *Nutrition Reviews*, **10**: 107, 1952); however, in all these cases, levels of 10 to 100 mgm. of antibiotic per kilogram of ration were used. This is equivalent to a daily dose of 5 to 50 mgm. in human subjects. Even with these low levels, some change in intestinal flora occurs. There seems to be an increase in coliform organisms and a decrease in anaerobes. Much larger quantities of the drugs are used in clinical therapy. Gewin and Friou (Manifestations of Vitamin Deficiency During Aureomycin and Chloramphenicol Therapy of Endocarditis Due to Staphylococcus Aureus, *Yale J. Biol. & Med.*, **23**: 332, 1951) reported severe vitamin deficiency in a 22-year-old man under treatment for subacute bacterial endocarditis; in this case, therapy consisted of 3 gm. of aureomycin given daily for 13 days, followed by the same amount of aureomycin plus 3 gm. of chloramphenicol for another 20 days. Vitamin Deficiency Signs During Antibiotic Therapy, *Nutrition Reviews*, **9**: 283, 1951). Doses in this range will undoubtedly produce large changes in the intestinal flora and will decrease the production of vitamins, especially B complex vitamins and vitamin K, but the additional effects of anorexia, vomiting and diarrhœa, which are common when high levels of antibiotics are used, cannot be overlooked in any consideration of vitamin deficiency.—*J.A.M.A.*, **150**: 627, 1952.

### Perianal Irritation Due to Aureomycin

The intense irritation in or about the perianal tissues caused by aureomycin and terramycin is dependent on an interference with the normal flora of the colon. The resulting changes in enzyme balance seem to produce irritative phenomena in these tissues. Dr. Albert Miltzer of the Department of Microbiology of Michael Reese Hospital, Chicago, observed that if these patients are given 2 teaspoonfuls of an elixir of vitamin $B_{12}$, folic acid, and ferric ammonium citrate four times a day with the aureomycin or terramycin, neither the diarrhœa nor the perianal irritation occur.

In addition, this consultant has used suppositories consisting of 1½ grains (0·09 gm. of sodium alkyl sulfate in coca butter as a suppository emulsion, which the patient inserts into the rectum three times a day.

Dr. Miltzer's work has not yet been published; however, it is his opinion that aureomycin and terramycin destroy the normal flora of the intestinal tract, particularly those organisms involved in the synthesis of vitamin $B_{12}$. Furthermore, the overgrowth of saprophytes and particularly Pseudomonas has been apparent to this consultant. The Pseudomonas organisms cause diarrhœa, with loss of proteins, electrolytes and mucus. In these patients, the use of antibiotics is stopped, the patients are put on a diet high in protein, and the flora are allowed to return to normal as soon as possible. In some patients, it has been necessary to use polymyxin B sulfate to overcome the luxurious growth of the Pseudomonas organism. It is this consultant's opinion that combinations of either of these two antibiotics with others should rarely, if ever, be used, especially post-operatively. The electrolyte and protein balance may be disturbed, and this may increase the morbidity in any given patient. With the use of the elixir referred to, all patients who have been given either aureomycin or terramycin are, as a rule, noticeably free from gastrointestinal manifestations, including perianal irritation. —*J.A.M.A.*, **150**: 627, 1952.

### Loss of Sense of Taste after Methylthiouracil Therapy

Schneeberg (*J.A.M.A.*, **149**: 1091, 1952) writes that two cases of thyrotoxicosis are reported in which complete loss of the sense of taste occurred during the administration of methylthiouracil. In one case of the cases partial loss of olfactory sense also developed. Complete restitution of normal gustatory and olfactory sensation followed omission of treatment with the drug.

### Caution in the Chemotherapy of Tuberculosis

Three recently developed antituberculosis drugs, isoniazid (isonicotinic acid hydrazide), iproniazid (1-isonicotinyl-2-isopropyl hydrazine), and pyrazinamide, are now undergoing extensive clinical testing. These drugs have shown definite but limited therapeutic activity against human tuberculosis, but there is much concern among workers in this field that their potential value may rapidly be neutralized if they are used improperly or indiscriminately by those not trained in the treatment of tuberculosis. The recent increase in the availability of isoniazid has brought this problem into acute focus.

One of the major threats to the effective use of the newer forms of tuberculosis chemotherapy lies in the possibility that physicians will attempt to use these drugs as the sole form of therapy. As the American Trudeau Society, the American College of Chest Physicians, and other organizations dealing with tuberculosis have repeatedly emphasized, these compounds are not in themselves cures in spite of the earlier optimistic publicity given to some of them. They, like other forms of chemotherapy, must be used as adjuncts to the time-tested measures of bed rest, collapse therapy and surgical procedures. Moreover, as adjuncts they have not yet proved clinically superior to, or even so effective as, the combination of streptomycin and p-aminosalicylic acid in the treatment of tuberculosis.

Another threat to the continued effectiveness of these drugs arises from the fact, now well established, that the tubercle bacillus is capable of developing resistance to them rapidly both *in vitro* and *in vivo*. In the clinic, bacilli resistant to isoniazid, iproniazid and pyrazinamide have appeared in some cases after only two to four weeks of therapy, although a somewhat longer period is usually required. Such organisms seem to develop especially rapidly in patients with far-advanced cavitary pulmonary tuberculosis, and their appearance is associated with a recurrence of symptoms despite continued treatment. In the laboratory, bacilli with a 5-fold increase in resistance to iproniazid and a 16-fold to 4,000-fold increase in resistance to isoniazid have been obtained by serial passage on media containing these drugs. Resistance to isoniazid, like that to streptomycin, may develop in a single step and may be present in organisms never previously exposed to the drug.

These observations emphasize the need for care in the use of the new drugs. Steenken and co-workers, (*Am. Rev. Tuberc.*, **65**: 365, 1952), and Grace and associates (*J.A.M.A.*, **149**: 1241, 1952) warn that if these compounds are used alone they may benefit the patient only temporarily and may prejudice his chance of future response to combined drug therapy, surgery, or both. This practice may also result in the widespread appearance of strains of tubercle bacilli resistant to these drugs and in the eventual infection of others with organisms resistant to both streptomycin and isoniazid or one of the other compounds. It is suggested by Grace and associates that these drugs be employed only in multiple combinations with streptomycin and p-aminosalicylic acid or other chemotherapeutic agents active against mycobacteria and not related by cross resistance. They base this suggestion on the well-established fact that the production of resistant variants of an organism can be inhibited by simultaneous (but not consecutive) exposure of that organism to at least two drugs with different modes of action. That this general principle applies specifically to isoniazid is suggested by the observation that no tubercle bacilli resistant to either isoniazid or streptomycin have been encountered in cultures exposed simultaneously to therapeutic concentrations of the two drugs, although strains resistant to both have been obtained by successive exposure to these compounds.

Still another hazard in the use of these drugs is that of inadequate dosage. Since there has not yet been time for adequate long-term evaluation of different dosage schedules for the different forms and stages of tuberculosis, it is obvious that no statement about optimum dosage or duration of administration can be made. It should be equally obvious that, until such information is available, use of the drugs should be limited to institutions where rigidly controlled observations on different treatment schedules can be made, recorded, and pooled with those of other institutions for final evaluation. Random use of the drugs on an empirical basis result only in waste, inefficiency, inconclusive results, and harm to some patients.

While there have been few toxic reactions to these drugs to date with the doses used, such reactions must be watched for carefully during and after pregnancy. According to the Committee of Therapy of the American Trudeau Society, "isolated instances of susceptibility to the effects of other drugs (particularly epinephrine, ephedrine, atropine, and demerol) and even deaths have been reported in patients receiving isoniazid or its isopropyl derivative, but the causal relationship has not been clearly established. Minor untoward effects which have been reported are hyperreflexia, constipation, postural hypotension and dizziness, difficulty in starting micturition, eosinophilia, and the appearance of casts, albumin, and reducing substances in the urine. Routine precautions during treatment should include frequent neurologic examinations, blood counts, urine analyses, and tests for renal and hepatic insufficiency. As both drugs are excreted through

the kidneys, impairment of renal function may result in the cumulation of toxic concentrations of the drug in the body. For this reason, the renal function should be measured before treatment and, if it is impaired, the dose should be reduced accordingly.

These facts must be considered carefully by every physician contemplating the use of one of the new drugs in a patient with tuberculosis.—*J.I.M.A.*, Ed., **149**: 1224, 1952.

### Self-Demand Feeding in a Maternity Clinic

Illingworth and others (*Lancet*, **1**: 683, 1952) write: 106 babies in a maternity unit of Jessop Hospital, Sheffield, were fed on a rigid feeding schedule of 6 feeds in twenty-four hours (the "rigid group") and 131 babies were fed on demand (demand group). In the latter group demands were more frequent between the fourth and seventh days. On the fifth day 36 babies (28·6 per cent) demanded 8 feeds or more and 2 babies (9·5 per cent) demanded 9 feeds or more. The "demand group" gained weight faster than those on a "rigid schedule." By ninth day 49·1 per cent of the babies in the demand group had regained their birth weight compared with 36·1 per cent of those in the rigid group. There was a strong positive correlation between the weight gained and the amount of milk taken in twenty-four hours and the quantity of milk taken from the mother's breast shown by the test feeds. There was a positive correlation between the number of feeds taken in twenty-four hours and the breast in that period.

There were more than twice as many cases of overdistension of the breast and soreness of the nipple in the rigid group as there were in the demand group. 27·4 per cent of the mothers in the rigid group developed soreness of the nipple compared with 12·9 per cent in the demand group; 34·0 per cent of the rigid group developed overdistension of the breast compared with 16·9 per cent of the demand group. 81 per cent of the babies of the rigid group and 94·4 per cent of the demand group were discharged fully breast fed. At the age of one month 64·5 per cent of the rigid group and 80·3 per cent of the demand group were fully breast fed.

There was no significant difference between the incidence of breast feeding in the mother who had over-distension of the breast in the rigid or demand groups either on discharge or at one month. At one month 85·7 per cent of the mothers in the demand group were fully breast feeding their babies, and 80·5 per cent of those in the rigid group. This figure corresponds closely with the figure of 80·2 per cent for the mothers in the demand group who did not have overdistension. But only 55·9 per cent of the mothers in the rigid group who had no overdistension were breast feeding their babies at one month.

It was concluded that self demand breast feeding by causing better emptying of the breast, and leading to less frequent soreness of the nipples than a rigid schedule, had a favourable effect on the establishment and maintenance of lactation.

### Vomiting in the Newborn

Mason-Brown (*Edinburgh M. J.*, **59**: 51, 1952) writes that vomiting in the newborn may be caused by neonatal obstruction. Most of the newly born babies who vomit at birth are suffering from cerebral trauma but if vomiting is persistent and bile stained, the author recommends investigation based on an accurate history, clinical examination, including that of vomitus and stools and radiology. Early vomiting indicates either complete obstruction or one high up. The absence of bile, frequent choking on its own mucus, the relief of cyanosis by repeated aspiration, the continuing presence of a finely aerated froth indicate oesophageal atresia. Pyloric stenosis starts later and symptoms get progressively worse. Duodenal obstruction being usually below the ampulla of Vater produces a bilious vomit. If incomplete or due to volvulus neonatorum, vomiting is often delayed to the third day. Normal meconium is passed in incomplete obstruction. None is passed in meconium ileus and small dry stools of mucous casts in complete obstruction. Clinical examination may reveal local distensions or visible peristalsis and in those with diaphragmatic hernia the stomach may appear small. An inguinal hernia may be discovered especially in premature infants. The diagnosis may therefore be suspected in many cases and just as for the surgeon it is more dangerous to procrastinate than operate, so delay in investigation may spell disaster. Investigation radiographically includes a straight x-ray for locally distended coils or for calcified meconium and a lipiodol examination *via* a stomach tube. The author discusses the preoperative and post-operative management, the anæsthetic, the vulnerability to infection, the details of operation. He gives encouraging revival rates for congenital diaphragmatic hernia, intestinal obstructions (17 out of 32 survived). As these children have a normal expectation of life, he bids those in charge of the newborn "to distinguish between the medical and surgical types of neonatal vomiting. and to secure the earliest treatment of babies with organic obstructions".

### Gastrointestinal Allergy in Infancy

Rosenblum and Rosenblum (*Pediatrics*, **9**: 311, 1952, Ref. *Indian J. Child Health*, **1**: 684, 1952) report on a series of 60 infants having gastrointestinal disturbances which appeared to be on an allergic basis, and correlate the clinical evidences of allergy with the demonstration of rectal eosinophilia. This study covered a period of 16 months.

The common symptoms were diarrhœa, vomiting or colic, either alone or more often in combinations. Diarrhœa was the most common symptom, being almost twice as common as vomiting or colic. Marked stool eosinophilia in these infants was present only when symptoms were active, and subsided when symptoms disappeared; however, some eosinophilia could almost always be demonstrated. The eosinophils in the stools are best found in the mucoid portion of the stool when fresh specimens are examined; a specimen obtained by insertion of the finger is very satisfactory. The specimen is allowed to dry without heat and undiluted May-Grunwald stain is applied for 30 seconds then diluted with an equal quantity of distilled water, and washed after a further 30 seconds; eosinophils generally appear bright red and granules are clearly visible. In contrast to these 60 cases who had an allergic basis and stool eosirophils, in 76 other infants with diseases in which no allergic basis could be determined no eosinophils were found in the stools.

Though the stools in these allergic diarrhœas were generally loose and frequent, the outstanding macroscopic feature was the abundant mucus; the stools did not have the foul purulent appearance of infectious diarrhœas. Except three cases which were severe enough to require hospitalization for administration of parenteral fluids, the general physical condition of the infants remained remarkably good. While the age of onset was predominantly in the early months, 35 per cent began after the third month, and a few after the first year. Spontaneous remissions and exacerbations occurred in some cases. Most of these patients were removed;

cow's milk was the most common offender. During recovery, the stools became normal and eosinophils were reduced or absent.

Vomiting which occurred early in infancy, generally in the newborn period, varied from slight regurgitation to projectile vomiting with pyloric waves being often present even in the absence of pyloric stenosis; these infants generally gained weight and remained in good health in spite of protracted vomiting. The stools of these infants contained abundant mucus even in the absence of diarrhœa. Medical treatment having failed surgery was successfully accomplished in 11 cases of pyloric stenosis, 7 of which showed stool eosinophilia; if allergy was present in the other 4 cases who did not show stool eosinophilia, it had not yet been obvious.

Colic which responded to removal of allergenic foods though not to ordinary formula changes was seen most in the first three months though not always so, as 5 cases began after the third month and one at the end of a year. The physical condition was good, but these infants were fretful and unhappy, some had severe cramps. Again the commonest offender was cow's milk.

A high incidence of allergic manifestation was observed in these infants, with a positive family history in 83 per cent of the cases. Eczema occurred in 32 per cent of the cases, asthma in 17 per cent. Attacks of wheezing and croup (particularly of the spasmodic type) were related to upper respiratory infections; these responded to adrenalin in the same way as asthma. Several of these infants had attacks of rhinitis with profuse nasal discharge, the latter containing large numbers of eosinophils.

Treatment was by removal of the offending foods from the diet. The most common offender was cow's milk, and changes in the diet generally involved some modification of cow's milk. Mild cases responded to evaporated cow's milk and if this failed other milk substitutes like goat's milk either plain or canned, Nutramigen or Mull-soy gave good results. In substituting one formula or another, one week's trial was necessary before drawing conclusions. It was observed that symptoms would return after reintroduction of offending foods. When these infants were adjusted to a satisfactory formula, new foods were cautiously introduced into the feeds, one at a time. Barley cereal and meat rarely caused trouble, wheat and eggs were common offenders. After 6 to 9 months on this therapy, most infants could tolerate cow's milk. The authors conclude that a good test for the cure of food allergy is the reduction of stool eosinophilia and the disappearance of symptoms when the allergenic food was removed from the diet.

### A Case of Ophthalmoplegia in Childhood due to Myasthenia Gravis

Chandy and others (*Indian J. Child. Health*, 1: 647, 1952) in giving a brief general description of myasthenia gravis point out that it is a disease of derangement of the myoneural junction, most probably either under production or excessive destruction of the acetylcholine by cholinesterase. Whether this cholinesterase is formed by the lymphorrhages in thymus and in the involved muscles, and act on the myoneural junctions in the involved muscle which may have been deranged to be sensitive to this cholinesterase is a matter of speculation. A case of myasthenia gravis in child-hood who had gone on with the disease for 7 years is described. The disease was controllable, with prostigmine, but thymectomy did not show any further improvement. The failure of thymectomy to give complete relief may be due to the long duration of the disease forming abundant lymphorrhages in the involved muscle.

### Pertussis

Labocetta and Dawson (*Am. J. Dis. Child.*, 84: 184, 1952) write that eighty-five patients with pertussis were treated with 50 mgm. of aureomycin per kilogram of body weight daily for 10 days, and 74 parallel controls received chemotherapy, penicillin, streptomycin, or sulfadiazine.

The difference in this course of pertussis between the aureomycin-treated patients and the control group under one year of age is slight and not statistically significant.

There was no apparent marked advantage in the course of pertussis from treatment with aureomycin over the treatment used in the control group when treatment was started after the first week of disease.

There appears to be no evidence to show that aureomycin gives significantly better results in the treatment of pertussis than does supportive treatment including no antibiotics, penicillin, streptomycin or sulfadiazine. Aureomycin is a valuable adjunct to the medicaments for the treatment of pertussis but does not appear to exert a curative effect on the disease. Along with other measures, including use of oxygen, sedation, nasopharyngeal aspirations, and proper nursing care, aureomycin may be of value in the management of the disease. The value of good nursing care cannot be overemphasized for the successful treatment of pertussis.

### Treatment of Children's Fractured Permanent Anterior

Braner (*Indian J. Dent. Rev.*, 21: 374, 1952, courtesy *J. Am. Dent. A.*) gives in the following lines the summary of his observations on the treatment of children's fractured permanent anterior:

A minimum of four examination requirements are recommended for a patient with a fractured central incisor; namely, (a) obtaining the history of the accident, (b) determining the relative firmness or mobility and the alignment of the tooth involved. (c) checking for vitality, and (d) the making of roentgenographic survey.

Anterior permanent teeeth which have been fractured or displaced may be divided or classified into the following types for purposes of treatment: (a) coronal fracture with little, if any, dentin exposed; (b) coronal fracture with varying degrees of exposed dentin, without pulp exposure; (c) coronal fracture with vital pulp exposure; (d) root fracture without coronal involvement; (e) coronal and root fracture with or without vital pulp exposure; (f) coronal fracture with or without root fracture, non vital pulp; (g) the displacement of anterior teeth with no coronal or root fracture.

A tooth with a coronal fracture and vital pulp, with considerable dentin exposed but without pulp exposure, should have a protective covering for a period of three to six months, if the blow was received within recent hours or days.

A vital pulpotomy is accomplished when the pulp is exposed and when there has been no displacement of the teeth.

A coronal fracture, wherein appreciable dentin is exposed, generally is restored by a modified three-quarter crown with an anterior silicate window. Such restorations are placed from three to six months after the accident, provided the tooth is firm, in acceptable alignment and the pulp is vital.

Root fracture in anterior teeth with vital pulps in many instances present a favourable prognosis.

## CURRENT TOPIC

### ANTIBACTERIAL SUBSTANCES FROM SOIL, PLANTS AND OTHER SOURCES

A symposium on 'Antibacterial substances from soil, plants, and other sources' was held on 26th and 27th March, 1953, in the St. Xavier's Hall, Bombay, under the auspices of the Pharmaceuticals and Drugs Committee of the Council of Scientific and Industrial Research. Dr. B. Mukerji, Director, Central Drug Research Institute, presided.

Dr. K. A. Hamied, Sheriff of Bombay, delivered the inaugural address. Among the distinguished visitors present were Sir Alexander Fleming and Professor C. Heymans, both Nobel Laureates.

Twenty-one papers dealing with the isolation, testing, standardization, therapeutic uses and mode of action of antibacterial substances from various sources were read.

A paper dealing with the extraction, purification, crystallization, bacteriology and pharmacology of Pristimerin, the antibacterial principle from Pristimera indica, was presented. This substance was reported to be active against gram positive micro-organisms in general and in particular against the viridans group of streptococcus as indicated by the laboratory studies and clinical trials. The chemistry of Pristimera which is being carried on in collaboration with the National Chemical Laboratory, Poona, was also discussed. Besides the above, investigations on antitubercular activity of principles isolated from Indian lichens being carried on in collaboration with the chemistry department of the Delhi University were also reported.

One worker presented data comparing the effects produced by streptomycin and isoniazid, while another paper dealt with the factors responsible for the sensitiveness and resistance of bacteria to penicilin. The isolation and the antibacterial properties of a substance isolated from *Zanthoxylum rhetsa*, a plant commonly used for the treatment of dyspepsia and diarrhœa, was also reported.

The workers from Bangalore reported the isolations of an anti-bacterial substance from Garcinia with special reference to Morellin, and Pterygospermin, the antibiotic principles of Moringa Pterygosperma. A chromatographic method for the identification of antibiotics from fermented beers and the preparation of indigenous substitutes for the corn steep liquor, an essential constituent in the production of penicillin, were also described.

One of the papers presented by the Calcutta group of workers described isolation and characterisation of antibacterial agents from some of the higher fungi whereas another contribution related to the studies on the production of antibiotic substances by a Streptomyces species.

The Lucknow group of workers presented papers on various aspects of research on antibacterial substances. One paper dealt with the production of an antibiotic from a bacillus, isolated from a sample of soil in one of the local gardens while another discussed the possibilities of production of antibiotics by higher myxobacteria—a group of organisms hitherto unexploited. A third paper dealt with antibiotics and drug resistance. Two more papers dealing with the mode of action of antibiotics were also presented by this group.

## NOTES AND NEWS

### WHO STATISTICS ON HEART DISEASE AND CANCER

Heart disease and cancer are still the biggest "killers" in Europe and the U.S.A., according to statistics published by the World Health Organization. Heart disease, however, claims more deaths than cancer in these countries.

In Britain, 151,800 people died of heart disease compared with 95,300 deaths through cancer in 1950. In the U.S.A., the figures were 532,000 and 210,000, respectively.

In Western Germany, deaths through heart disease amounted to 80,000 and cancer 83,000. In France heart diseases accounted for 89,000 deaths and cancer 74,000, while in Italy the figures were 82,000 and 49,000, respectively.

In Japan, tuberculosis caused 120,000 deaths in 1950 followed by cancer with 67,000 and heart diseases with 50,000.

### WORLD CANCER DAY

On the necessity of observing a World Cancer Day, Rajkumari Kaur said: "Cancer causes its ravages among the people of the entire world. It knows no barriers of age or sex or of social and economic environment. Scientific knowledge has not advanced far enough to reveal to us the exact method by which healthy tissues become cancerous. Cancer of certain parts of the body is more common in some people than in others.

"A constant exchange of information on all these matters between different countries is therefore essential.

"Keeping these facts in mind, the delegates of 45 nations who met in Paris in 1950 at the Fifth International Cancer Congress unanimously voted that such a day should be observed every year in all countries represented by them in order to intensify the struggle against cancer. I am glad to say that India was one of the participating countries.

"Our fight against this fell disease should be pursued along three definite lines:—

(i) Early detection of the disease and the commencement of an immediate and effective treatment for it.

(ii) Continuation of investigations on cancer, particularly directed towards improved methods of detection and treatment as also investigation on factors contributing to the origin and development of the disease in order to enable us, if possible, to adopt suitable methods of prevention.

(iii) A solution of the social problems posed by cancer. These would vary in different localities and environments, but they would all be concerned with (a) timely aid and care of the sick, (b) alleviation of the miseries caused by the disease and (c) provision for hospitalizing both the curable and incurable cancer patients."

### POST-GRADUATE MEDICAL FELLOWSHIPS

The Rockefeller Foundarion recently announced a grant of Rs. 5,50,000 to the Indian Council of Medical Research for post-graduate medical fellowships. The Council will help train in the next three years additional Indian medical students to teach in India's medical colleges.

The foundation announcing the grant stated: "At present there is a shortage of faculty in the medical colleges especially in junior posts. The Council which is already supporting 26 trainees annually will add another 25 each year. Ordinarily each fellowship will last for two years."

### HYGIENE INSTITUTE'S NEW DIPLOMA COURSES

The All-India Institute of Hygiene and Public Health, Calcutta, will institute a new nine-month diploma course in

public health nursing from June 1. The course has been designed to train nurses possessing the senior nursing certificate from any of the Nursing Councils of India or its equivalent for positions at any phase of community nursing service.

The fresh courses of the Institute for diplomas in public health, maternity and child welfare, industrial health, dietetics, Master of Engineering (Public Health) and certificate courses in biometric technique also commences from June 1.

## DIET SURVEY IN INDIA

The latest diet survey in India reveals that the Punjabi diet is the richest in calorific value, while Bhopal's diet is considered one of the poorest.

Against the average calorie value for all diets in India, reckoned at 2,336, Punjab (I)'s average figure was as high as 3,330, while Bhopal's average was 1,918.

The average nutritive value of foods consumed in other States are: Assam, 2,496; Bihar, 2,277; Bombay, 2,222; Coorg, 2,726; Delhi, 3,292; Hyderabad, 2,690; Kashmir, 3,158; Madras, 2,068; Mysore, 2,889; Orissa, 2,617; Travancore, 2,316; Uttar Pradesh, 2,648; West Bengal, 2,971.

Only in 332 groups, or barely 42 per cent of the surveys made, was the average consumption of calories per day found to exceed the 2,500 level. In about 15 per cent of the surveys the daily intake exceeded 3,000 calories and in about 9 per cent of the surveys the upper limit was only 1,500 calories per day.

The report draws the conclusion that in an appreciable percentage of families the intake of calories was below the desired level. In other words, the consumers in such families were not having enough to eat.

The report of the diet survey also indicates the percentage distribution of calories from the cereal and non-cereal sections of diet. In Ajmer, for instance, the percentage of calories from cereals is as high as 97.

In a reasonable balanced diet, however, cereals should contribute about 60 per cent of the total calories. In most States, the cereal quota was found to contribute approximately 70 to 80 per cent of the total diet average.

To most people in India, non-cereal food is not easily available due to high prices. This accounts for the increased cereal element in the diet. This is considered an unhealthy feature.

Industrial labourers, for their higher energy requirements, consume a larger percentage of calories, derived from fats. The average diet of the student, on the other hand, possesses a higher nutritive value than that of industrial workers. Students appear to derive their high percentage of calories from pure energy foods such as ghee, sugar and jaggery, in preference to the calories obtainable from milk or meat. This is not considered a happy feature. It needs to be remedied with proper education says the report.

An average healthy person, it is stated, requires 60 grams of proteins. The average figures for intake of proteins for each State vary between 53 grams in Madras to 107 grams in Ajmer. The mean figure for the whole of India was 63 grams.

Individual figures for the States are all above 60 grams except those pertaining to Travancore-Cochin and Madras. The percentage derived from animal foods varied from 1 to 22. In 11 out of the 17 States surveyed, the quota of animal protein did not exceed 10 per cent of the total intake.

The daily requirement of calcium is estimated at 1 gram per adult. In 397 surveys, or about 57 per cent of the groups investigated, consumption of calcium did not exceed 600 mgm. per day. The report also draws the conclusion that the consumption of vitamins was also much below the desired level among most consumers.

## T. B. HOSPITAL AT JAMSHEDPUR

The Ardeshir Dalal Tuberculosis Hospital at Jamshedpur was opened on 27th March by Dr. Srikrishna Sinha, Chief Minister of Bihar. The institution aims to provide not only the normal facilities of a T. B. hospital but also occupational therapy for patients under treatment or while convalescing. The means for occupational therapy such as workshops and the like will also be utilized to enable the families of patients to maintain themselves while the patients are under treatment. Employees of the Tata Iron and Steel Co. and associated concerns will be admitted to this hospital free of charge.

The equipment of the hospital, which is on modern lines, includes a small operation theatre and a 500 mA x-ray apparatus with accessories for serial and layer radiography. The hospital has accommodation for forty patients.

## THE COLLEGE OF GENERAL PRACTITIONERS

The first meeting of the fully constituted Foundation Council of the College of General Practitioners was held recently in London. At this meeting, an important change in the policy of the college was made and it will be noted that, whereas under the original regulations, Membership and Associateship were confined to practitioners with qualifications registered with the General Medical Council, it is now in order for any general practitioner with equivalent registration in a country or State within the British Commonwealth and the Republic of Eire to join the College without further formalities.

## COURSE IN POST-GRADUATE GASTROENTEROLOGV

The National Gastroenterological Association announces that its Fifth Annual Course in Post-graduate Gastroenterology will be given at the Hotel Biltmore in Los Angeles, Calif. on 15th, 16th, 17th October 1953.

The course will again be under the direction and co-chairmanship of Dr. Owen H. Wangensteen, Professor of Surgery of the University of Minnesota Medical School, who will serve as surgical co-ordinator and Dr. I. Snapper, Director of Medical Education, Cook County Hospital, Chicago, Ill., who will serve as medical co-ordinator.

Drs. Wengensteen and Snapper will be assisted by a distinguished faculty selected from the medical schools in and around Los Angeles whose presentations will cover: all planes of gastrointestinal diseases and problems.

One complete session will be devoted to a Clinic at the College of Medical Evangelists at Loma Linda.

## INTERNATIONAL CONGRESS FOR MICROBIOLOGY

The Sixth triennial session of the International Congress of Microbiology will be held in Rome between the 6th and the 12th September 1953. All persons interested in the subject of microbiology can become members of the Congress to entitle them to attend the scientific meetings and to present original papers, receive official publications of the Congress, membership card, invitations to receptions and excursions.

## CORRESPONDENCE

*The Editor is not responsible for any views expressed by the contributors*

### SALT DEPLETION

SIR,—I am very much interested to note in the article on "Salt Depletion" by Dr. Mirle Puttaiya (April, 1953) a simple diagnostic test for salt depletion, the end point appearing anywhere between one and five drops depending upon the severity of the case.

It appears from his article that Fantus' test was employed in cases where urinary excretion of chloride was low due to loss of sodium chloride *via* gastrointestinal secretions. But there are cases where salt depletion occurs in an occult manner through the urinary passages e.g., in Addison's disease, osmotic diuresis, metabolic acidosis and in rare condition like salt losing nephritis. Can Fantus' test be profitably employed in these cases, the end point reaching say at 6, 7 or more drops of $AgNO_3$ solution?

Salt depletion categorically means sodium depletion and the test mentioned cannot possibly give any idea of urinary sodium.

I shall be grateful if the author clarifies these points through your columns. I am, etc.

Calcutta, 6-4-53. B. GUPTA (M.B.).

* * * * *

SIR,—I have to thank Dr. Gupta for asking me to clarify some points in connection with my paper on 'Salt Depletion' since published in your magazine. He has afforded me an opportunity to indicate the limitations of the application of Fantus' test. I did not wish to dilate on this test very much in my paper. As always happens when you attempt to simplify matters you always sacrifice some essential details.

Fantus' test is just a chemical test to establish the presence of salt in urine. Under certain circumstances, characterised by definite physical states in a person whose urine is subjected to this test, it can give an idea about the salt concentration in the blood. Not only is it qualitative but the strengths of the testing solutions have been so adjusted as to make the test quantitative also.

One of the functions of sodium chloride is to maintain the constancy of the environment of the cells. This is effected only if the kidneys are functioning properly. The plasma sodium chloride concentration is 560 to 630 mgm. per 100 c.c. If this level increases as when there is excessive intake of salt with food (the average daily requirement of an adult is 10 to 15 gm. per day) or when there is resorption of exudates of the body the concentration of sodium chloride of blood increases. The kidneys will begin excreting sodium chloride in urine till the normal level is reached and will stop further excretion if the plasma level falls below normal. There is a daily output of about 10 gm. of salt in urine in 24 hours and the intake usually exceeds the body requirements and the surplus is excreted in urine just as in the case of water. Normally the excretion of Na in urine keeps pace with Cl and that of sodium chloride in urine with that of the blood. But when there is an upset in the acid-base equilibrium this agreement is disturbed. The ability of the kidneys to excrete Na and Cl together has, therefore, an important bearing on the administration of the salines. There is an upper limit to the ability of the kidneys to excrete salt in urine. In adults urine can only attain a concentration of 2 per cent of salt and not more and in children this level is much less. In damaged kidneys, this concentration cannot become more than 0·4 per cent. If the kidneys have to deal adequately with the ingested salt, the following conditions should be present. The kidneys should be healthy, the quantity of salt taken with food or parenterally should be only so much as a 2 per cent concentration in urine can deal to maintain the salt balance properly. If the ingested salt has to be excreted as NaCl, there should not be a gross upset of acid-base-equilibrium.

If, therefore, Fantus' test has to give an accurate indication regarding the state of chloræmia, the kidneys should be functioning properly concentrating urine sufficiently and there should be no serious upset in acid-base equilibrium in blood so that the kidneys could excrete Na and Cl together. Also the suprarenals should be healthy as otherwise there would be excessive excretion of salt in urine though the concentration in the blood be normal or even less than normal.

Salt excretion in urine decreases in convalescence from acute pyretic diseases, severe dehydration, in œdematic states and renal diseases. The first two states satisfy the conditions necessary for Fantus' test to be a reliable indicator as the state of chloræmia. The manifestations of alkalosis and acidosis in dehydration are of secondary importance as compared to the loss of osmotic pressure of the extracellular fluid as the kidneys automatically restore the acid-base balance by appropriate differential excretion of Na and Cl, if salt is administered along with sufficient water (H. L. Marriott). But this will not apply to acid-base upset obtaining in metabolic acidosis. In the last two states the test therefore fails to give a correct indication. Similarly, in Addison's disease, the test is not applicable as the concentration of salt in urine has no relationship whatsoever to its concentration in blood. In osmotic diuresis and salt-losing nephritis due to selective excretion of water and salt in urine respectively the salt concentration in urine has no bearing on that in the blood.

I quite agree with Dr. Gupta's observation that 'Salt Depletion' categorically means Na-depletion as sodium-ion is more important from the osmotic standpoint falls and data regarding falls in sodium levels would be more relevant; also that Fantus' test does not give any idea of urinary sodium.

In spite of the above mentioned limitations of the application of Fantus' test, it is such a useful test particularly for us in tropics where heat effects are so common to determine when it is necessary to give salines and when not, that it has come to be incorporated in the 1951 edition of Hutchison and Hunter's "Clinical Methods", while H. L. Marriott mentions in his article referred to by me previously—"It is my belief that means for performing this simple test should be available in all ward test-rooms and in every doctor's bag", I am, etc.

Bangalore, 25-4-53. MIRLE PUTTAIYA.

### DOUBLE SHIFT SYSTEM OF TRAINING IN MEDICAL COLLEGES

SIR,—The last All-India Medical Conference in Patna passed a resolution viewing with grave concern the recommendation of the Indian Medical Council to adopt double shift system of training in medical colleges on the ground that it will lower the standard of medical education. Those who were in favour of this system wanted it to be introduced in the preclinical stage only and wanted to suggest the upgrading and affiliation of the existing non-teaching

general and maternity hospitals in the area of the existing medical colleges and in outlying cities.

We feel that the subject was not considered dispassionately in all its aspects at the last Conference. The Medical Council is expected to see that the adoption of this system does not lead to the deterioration of the standard. The Council sends its Inspectors periodically to visit the medical colleges for this purpose. We believe that the reasons that led the Medical Council to recommend the double shift system is the great dearth of properly qualified doctors in India and the difficulties in establishing new medical colleges in a short time. The dearth of independent professional staff for the new medical colleges is also another factor favouring the introduction of double shift system in the existing medical colleges.

We, therefore, request you to publish in your journal the point of view of those who were in favour of the shift system under certain conditions for the information of those who did not attend the Conference.

The Planning Commission has also emphasised in its latest report this dearth of qualified doctors in India. At present 2,500 students only are admitted every year to 30 medical colleges in India. The Commission (in Chapter XXXII para 73 of the report) has fixed the target of 4,000 yearly admissions by the year 1955-56, i.e., 60 per cent more than the present number in the course of three years. The number of students that seek admission to the medical colleges every year must be about 6,000, judging from the figures of Bombay State. It is a tragic sight to witness this bar to the admission of so many students.

We were surprised to find some responsible doctors alleging during the last medical conference that there was no dearth of doctors because about 100 doctors from West Bengal went to Burma on service. Surely this only means that these doctors found better emoluments in Burma and not that they are too many in India. Doctors are going to East Africa every year on the same ground but nobody thinks that, that points to an excess of doctors in India.

A former Health Minister of a State held that there was no need to increase the number of medical colleges in that State because doctors passing out of them did not go to the mofussil. The statement is not quite correct as we find that qualified doctors have settled in all taluka towns and in many village panchayats also. If there were better educational facilities in these areas more would go; but the main reason is the dearth of such doctors. When the cities become so crowded with them that they don't get enough for their maintenance they will automatically move into the interior parts of India. If we really believe that people living in village areas have as much right to get proper medical attendance as the city people have the solution lies in increasing the number of such doctors and improving the village areas in education and better transport. The Five-Year Plan is meant to achieve all this.

As stated above we are in favour of double shift in preclinical years only. The personnel for this viz., assistant professors, demonstrators, etc., will be readily available in the big cities and the expenses for this will be largely met from the extra students' fees. This system will also incidentally prepare the teaching staff that will be required for the new medical colleges that are going to be established in outlying cities.

Slight changes in the existing medical colleges may be necessary. If these arrangements are made we fail to see how double shift could cause deterioration in the standard of education.

The clinical training of these students is to commence one and a half years after the introduction of double shift system. We suggest that a committee consisting of the surgeon-general of the State, the deans of medical faculties of the universities and the deans of the medical colleges should approach the non-teaching hospitals and advise the State Government on the steps to be taken to equip them for teaching purposes.

The problem is not as simple as it appears to be but as the Central and State Governments are committed to provide funds and facilities for the training of a much greater number of students it should not be difficult for the committee to overcome the difficulties met with.

We were sorry to find that the resolution recommending the starting of new medical colleges in mofussil areas was thrown out at the last Conference on the ground that patients in large numbers would not seek admission to mofussil hospitals!

By mofussil we do not mean village areas. There are many cities in India with a population of one lac or more and with general and maternity hospitals whose combined bed accommodation is 400 or more. These when upgraded and co-ordinated will be able to train the students for at least the first year and a half of the clinical courses. The large population of these cities and the surrounding suburbs will ensure adequate and varied outdoor attendance of the patients for the clinical training of students. The Planning Commission has suggested that new medical colleges *should* be started in such outlying cities so that the extra expense to the State on the clinical training of medical students will be much less. The work of upgrading these hospitals should in our opinion be taken up immediately with the grants earmarked for this purpose by the Planning Commission.

Another advantage of this measure is that it will provide internship to all the students who will pass the final test examination and who will have to do internship for one year before the M.B.B.S. degree is conferred on them. When new medical colleges are later on started in these cities the hospitals will be found to be ready to admit the students for clinical training. This will improve the quality of their work also and will be a boon to mofussil areas.

A Central Pathological Laboratory and a post-mortem room with facilities for teaching, and hostel accommodation for students and internees near these hospitals should receive early attention of the Central and State Governments. The Planning Commission has in para 74 Chapter XXXII drawn pointed attention to the up-grading of these hospitals.

The double shift system in the present medical colleges may continue even after the establishments of new medical colleges because by that time the non-teaching hospitals in these cities will be equipped for teaching and affiliated to the existing colleges.

We feel that instead of waging a fruitless controversy at long range on this problem the I.M.A. should urge the Central and State Governments to appoint such Committees to go over this problem. We are, etc.,

Bombay,
16-3-1953.

(Dr.) U. B. Narayan Rao,
(Dr.) H. V. Tilak.

# SUPPLEMENT

# Journal of the Indian Medical Association

VOL. XXII. No. 9 CALCUTTA JUNE, 1953


## TRAVANCORE-COCHIN MEDICAL CONFERENCE, QUILON

The Conference met at the Government House, Quilon, on 22-11-1952. About 200 members from all over the Travancore-Cochin State and also representatives of the neighbouring districts of Madras attended the Conference.

Col. K. G. Pandalai, who inaugurated the Conference said that the manufacture and sale of spurious drugs which had become rampant, was a great threat to the progress of medicine. He said that while it was necessary to make the country self-sufficient in the matter of drugs and instruments, particular care should be taken to ensure that quality did not

COL. K. G. PANDALAI INAUGURATED THE CONFERENCE

deteriorate. He said that while the practitioners of indigenous systems did useful service especially in the rural areas, they should not use instruments and drugs about which they had not sufficient knowledge. He congratulated everyone concerned in starting in Trivandrum a Medical Teaching Centre of such great promise and hoped that care would be taken to provide the College and the Teaching Hospitals with first class equipment and teachers. He stressed the growing importance of preventive medicine and said that the future doctor would be judged more by his ability to prevent diseases than by his skill to cure. He said that a comprehensive Public Health Act like the Madras Act should be enacted in all the States and scrupulously enforced. He also said that medical registration would be a mockery if unregistered medical practitioners were allowed to practise.

Dr. K. P. Raman Pillai, Chairman of the Reception Committee in his welcome speech pointed out the serious threat to the public health of the town of Quilon caused by the growth of industries, especially the cashew nut industry, without proper attention to sanitation and housing conditions.

DR. K. P. RAMAN PILLAI,
CHAIRMAN OF RECEPTION COMMITTEE

He deplored the absence of a protected water supply or modern sanitary facilities in that important industrial town. He invited the attention of the Medical Association to what the American Medical Association was doing in protecting the medical profession from the manufacture and sale of spurious drugs.

Dr. C. O. Karunakaran, the President, in his introductory speech said that the American Medical Association and the Medical Associations in other advanced countries had a deciding voice in the matter of medical education, manufacture and sale of drugs, etc., because they were so efficiently organised and spoke for the profession as a whole. No Government could ignore their unanimous decisions.

The Indian Medical Association had been handicapped by many obstacles, the opposition of the foreign elements who dominated the I.M.S. controlled civil medical service also, the caste distinctions of the profession caused by the co-existence of different grades of qualifications, the conflict of interests, between Government servants and private practitioners, and the political disintegration of the country. He said that they have now got over some of these difficulties and had begun to organise. But even before attaining full stature the Association was faced with momentous problems —the conflicting views on medical education, the pseudo-patriotic considerations behind the attempted revival of the indigenous systems, the restrictions on import of drugs and

DR. C. O. KARUNAKARAN,
PRESIDENT OF THE CONFERENCE

DR. P. ARUNACHALAM INAUGURATED THE SCIENTIFIC SESSION

instruments, the manufacture of spurious and poor quality instruments and drugs, etc. On all these they have to educate both the Government and public.

### SCIENTIFIC SESSION

The Scientific Session began at 6 p.m., and was inaugurated by Dr. P. Arunachalam, Director of Medical Services, Madras.

The President of the Association welcomed the speakers.

Dr. P. Arunachalam in his inaugural address drew the attention of the audience to the scope offered for the advancement of modern medicine in the State by the opening of the Medical College in Trivandrum. He also mentioned some of the more recent developments in the treatment of diseases.

Dr. J. Axel Hojer, Principal of the Trivandrum Medical College, then read a paper on "the Evolution of Preventive Medicine" and indicated the broad outlines of the growth of social medicine from its infancy a hundred years ago to its present position.

Dr. P. Rama Rau, Madras, then spoke on the scope of radiology in the treatment of 'Non-Tubercular diseases of the Lungs" illustrating his speech with numerous skiagrams.

### RESOLUTIONS PASSED AT THE CONFERENCE

1. This Association notes with regret and disappointment that the Part B States have not yet been given representation on the Indian Medical Council notwithstanding the hopes held out by the Central Government about a year ago that immediate action would be taken in the matter. Resolved that the State Government and the Indian Medical Association be requested to move the Central Government immediately to redress the inequity.

2. This Association views with grave concern the reported move of the Indian Medical Council to permit the introduction of shift system in the Medical Colleges, as this is bound to further deteriorate the already low standard of medical education.

3. This Conference views with grave concern the present practice of unrestricted sale of antibiotics, special vaccines and poisonous drugs by the so-called chemists to unqualified practitioners including Vaidyas and Compounders and request the Government to enact the necessary measures to remove this serious threat to human lives.

4. Resolved to bring to the notice of the Government the urgent necessity of giving the consideration to the views of the Medical Association through its accredited representatives, on all matters affecting the medical and public health problems of the State.

## IV HYDERABAD STATE MEDICAL CONFERENCE, NIZAMABAD

The 4th Hyderabad State Medical Conference was held under the presidentship of Dr. Benkat Chandra, in a well decorated pandal in the Civil Hospital compound at Nizamabad on 30th November and 1st December, 1952. About 160 medical men from all over the State attended.

The proceedings started with Jana Gana Mana by Dr. Mrs. Kriparam of Adilabad. Dr. L. R. Deshpande, the Chairman of the Reception Committee in his welcome address narrated the historical importance of the city, the various medical and Public Health problems specially malaria, the poor economic condition of the State in general and his district in particular.

Shri Phoolchand Gandhi, Minister, Health and Education thanked the Association for asking him to inaugurate the Conference and promised to extend his helping hand to all

such activities of the Association which would improve the health of people.

Dr. B. Chandra, the President of the Conference, thanked the medical men for asking him to preside over the Conference and promised to do his best to further the activities of Indian Medical Association. In his presidential address Dr. B. Chandra said:—

"The standard of medical education inspite of all efforts is gradually going down and it would be unwise if short term courses of 3 years are introduced again. For higher post-graduate degrees like M.D., M.S., instead of each University conferring such degrees there should be one central strong examining body just on the same lines as I.P.S., I.A.S.

DR. B. CHANDRA,
PRESIDENT OF THE CONFERENCE

It is not wise to discourage our young graduates to go to U.S.A. or United Kingdom for higher studies, but certainly the persons who want to go must be properly selected and should be of proper calibre.

The Pathology Department of State Medical College should be overhauled. Post mortem facilities should be extended and a legislature should be enacted that whenever medical men deem it essential a dead body of any person should be subjected for post mortem.

More X-ray plants and Radium should be made available.

Senior men with proper experience and aptitude and zeal for teaching should be made as the heads of the departments. They should work whole time but they must be adequately remunerated. Congenial environment should be provided for such people and others who want to conduct research work.

In these days when medical science is fast advancing it is not wise to spend high amounts on burnt out systems like Ayurved and Unani by providing courses of 5 years training. A State Government may encourage these systems to the extent of serving at an out-patient department. If any research is to be done one Central College at Delhi will be sufficient.

Three well equipped hospitals with 300 beds should be provided for three subas. For medical aid to the villages a fully organised chain of mobile units will render great relief to the villages.

It is not fair to ask a medical man to go to villages for humanitarian work without giving him sufficient amenities of life and a sense of security about his future.

It is essential that the Drug Act should be enforced in the State as early as possible.

All medical men whether in service or private practice should not only become members of the Association but also must take active interest in all its affairs.

The Provincial Branch will have its own building in the very near future where medical men will have scientific discussions and also recreational activities.

Every one should extend his helping hand to raise a suitable memorial to late Dr. Major M. G. Naidu, who always stood for the upkeep of medical prestige, honour, uprightness and maintenance of medical ethics in Hyderabad.

In the afternoon the Scientific Session was held in the same pandal under the Presidentship of Dr. G. S. Melkot, Finance Minister of the State and a past President of the Provincial Branch. Major-General S. L. Bhatia, Inspector-General, Medical and Health, inaugurating the session gave a detailed account of the various activities of the department.

Dr. G. S. Melkot, in his concluding presidential address exhorted medical men to rise to the occasion and play their part in the five year plan and help the country in every possible manner.

### RESOLUTIONS PASSED AT THE CONFERENCE

*I*: Whereas the increase of population has been out of all proportions to the general economic conditions of the State; and whereas this has resulted in continued malnutrition and poor development of the health of children—the future citizens of the State on the one hand, and has given rise to increasing stress and morbidity amongst mothers in particular;

It is hereby resolved that this Conference do urge upon the medical profession of the State to undertake to educate the public in the advantages of scientific and rational family planning and give them all needed technical advice and wherever possible, assistance, as part of their routine professional work.

*II*: Whereas the need for wider and more broad-based technical advice in the formulation of the Health Policy of the State has been reorganised;

And whereas the Government of Hyderabad accordingly formed an Advisory Board of Health comprising, rightly amongst others, of regional representatives of the Hyderabad Provincial Branch of Indian Medical Association, and whereas this Board has never met so far;

And whereas it is imperative now to set ourselves to national planning for health;

It is hereby resolved that while this Conference deplores the half-heartedness shown by the Government in taking consultations from this Advisory Board, it is urged that a meeting of the Board be called forthwith when the plans of the Government, if any, be laid before it and a rational and scientific plan evolved for such expansion of State's health organisation as may be conducive to quicker, more obvious and more effective results.

*III*: Resolved that the Hyderabad State Government be requested to enforce the Drugs Act immediately.

*IV*: Resolved that the hotels and coffee clubs be made to use processed milk substitutes thus releasing the fresh milk for the use of babies.

*V*: Whereas it is becoming increasingly necessary to use antibiotics and other newer remedies for maintaining the health of the people; and whereas supplies of these in Government institutions is very limited, this Conference urges upon the Department of Health to revise its policy in respect of supplies of positively more effective remedies and making them available for free use for the indigent, to achieve which the following remedial measures be adopted:

(1) Enforcement of stricter controls in the use of these drugs thereby preventing its abuse.

(2) Requesting the Government to exclude them from the purview of taxes as they are so essential to save the lives of people.

(3) Limiting the number of new dispensaries being opened till the basic conditions in the life of nation improve.

*VI*: This Association urges the Government to improve the vital statistics in our State by:

(i) Strict enforcement of Births and Deaths Act of 1949 whereby the Registrars for births and deaths have to be appointed;

(ii) Appointment of Sub-registrars for registration of births and deaths for every 30 square miles;

(iii) Insistence of birth certificates on every walk of life;

(iv) Enforcement of Infectious Diseases Act wherein all medical men must notify the notifiable diseases.

(v) Insistence on death certificates by a medical man.

PAPERS READ AT THE SCIENTIFIC SESSION

1. Recent advanced treatment on Tuberculosis in Western Countries by Dr. M. K. Pandit; 2. T. B. Meningitis by Harischander; 3. Anæsthesia by Nandakarni; 4. Acute Abdomen by B. Dayanand Rao; 5. Use and value of BAL in Arsenical Encecaphalopathy by Shanker Rao; 6. Giardiasis by Dixit; 7. Reticulosis by Akthar Hussain; 8. Anæmia by Ram Mohan; 9. Vital Statistics in our Country and how to improve it, by V. Prahlad; 10. Study of natural history of the disease by Gopal Rao; 11. Granuloma inguanilis by Joshi; 12. Surgical treatment of Bells' Palsy. by Venkat Rao; 13. Value of rest in treatment of T. B. by Rahman; 14. Eosinophilia by Amrit Narayan; 15. Coronary Thrombosis by Subbarayadu; 16. Imperforate anus by K. A. Rao; 17. Duties of medical men in five year plan by Dr. G. S. Melkote.

## XXI MYSORE MEDICAL CONFERENCE, BANGALORE

The 21st Mysore Medical Conference was held in Bangalore on February 6th, 7th and 8th, 1953. Dr. B. V. Mulay, President of the Indian Medical Association inaugurated the function. Dr. B. R. Ramalinga Reddy, President of the Mysore Medical Association (Provincial Branch of I.M.A.) presided and Dr. Md. Shafi Mehkri, President of Bangalore Branch of the Indian Medical Association was the Chairman of the Reception Committee. After a pleasant invocation by Miss Chudamani. Dr. Mehkri gave a welcome to one and all. Dr. B. V. Mulay next made his inaugural speech. After the messages were read by Dr. P. T. A. Chette, Organising Secretary, Dr. B. R. Ramalinga Reddy, delivered the Presidential address. Dr. T. S. Tirumurti, ex-President of I.M.A. attended the conference.

The first item of the scientific session which commenced just after, was a Seminar on Nutrition under the Presidentship of Dr. T. Chandrasekhariya. The seminar was arranged with previous examination of all the papers of the different authors so that there should be no clashing of ideas. Biochemists of the Central Food Technological Institute, Mysore; Indian Institute of Science, Bangalore; Biochemical Research Laboratory, Madras; the general practitioners and public health personnel, all took part in the proceedings.

In the afternoon the section of preventive medicine met in session under the presidentship of Dr. V. N. Krishnamurthy. Four papers were read. The session in Tuberculosis followed with Dr. A. C. Shankara Iyer in the chair.

The same evening there was a popular lecture by Dr. M. Shivaram on "Trends in Modern Medical Treatment", presided by the Health Minister Sri T. Channiah. The Surgical session commenced on 7-2-53 with Dr. C. V. Shankarambal in chair. 17 papers were discussed.

Medical section started in the morning of 8-1-53 presided over by Dr. S. V. Govinda Setty. A lecture by Dr. T. S. Tirumurti on "First things First in Medical profession" and by Dr. B. V. Mulay on Indian Medical Association, were delivered.

Dr. B. V. Mulay inaugurating the conference said "For improvement of the health of the country and her nationals, radical changes will have to be made in the field of sanitation and relief. The whole system of medical education has to be reoriented as on it depends the progress of health, relief as well as sanitation and the medical faculty". He continued that "the I.M.A. has a definite plan of medical education well thought out from all points of view, progress, speed, smooth working, finances and uniformity and the doctors must unite to make the representation of I.M.A. views strongest, in the faculties and the councils." Dr. Md. Shafi Mehkri, the chairman of the reception committee extended a hearty welcome to the delegates and guests. In his speech he referred to the question of lower grade medical education, family planning, quackery and medical help in rural areas. Dr. B. R. R. Reddy, the president in his address, said:

"We are living in an era when medicine in all its branches is making rapid strides in advancement. There has been practically no advance in the fundemental sciences without its influence on medical research and practice. Specialisation in different branches is the rule of the day and in many instances is overstepping the desired mark. To quote only a few examples of this rapid progress in medicine I may mention that the secrets of nutrition and of metabolic processes and the agents which govern them have been revealed; Hormones have been isolated and Vitamins synthesised, special reference required being Cortisone and Vitamin B 12. Drugs have been produced which have practically replaced the old galenicals. Bacteriology and protozoology have not only progressed in finding causitive organisms of disease but devised measures of increasing individual immunity to infectious diseases. Bacteriologists and chemists have toiled together to bring forth newer Anti-Malarials, Sulphanamide Drugs, and Antibiotics which have revolutionised our treatment of established disease and even altered its clinical pattern. Tuberculosis, Leprosy and Venereal Diseases have all been effectively tackled by the use of Chemotherapeutics and antibiotic agencies; diseases like Plague and Puerperal Sepsis are no longer looked upon with the dread they used to be in the past; the diabetic has a more hopeful outlook. Side by side we have much better methods in investigation into the causation of diseases. Improvement in the technique of Radiology has enabled us to visualise practically every crevice and cavity of the body and have advanced accuracy in diagnosis to an almost incredible degree; radio active Isotopes promise to solve many problems and add to our diagnostic and therapeutic implements. Surgery has been made more safe, and more daring operations are now undertaken. Successful extension of surgery to the brain, the lungs, and the heart have all been made possible through advances in diagnostic accuracy of instruments, improved methods and techniques of anæsthesia, and measures for combating infection, shock and hæmorrhage by the use of antibiotics and blood transfusion. No less has been the advance in the methods of preventive medicines. Large areas are now made free from the menace of Malaria; Epidemics are quickly brought under control by the use of powerful agents. Diseases like Tuberculosis and Leprosy which steadily spread and held little hope in the past of a control programme are now successfully tackled. The B.C.G. vaccination campaign has great promise of controlling Tuberculosis in the country. I may here mention that the Mysore State has been one of the earliest to launch an intensive B.C.G. vaccination campaign which is in brisk progress. Treatment of infectious cases of Leprosy by the newer Sulphone Drugs controls the spread of the disease by reducing the infective foci. These are only some examples.

All this progress and specialisation have not been altogether without the associated ills; to the specialists, man has lost his entity as a "whole man"—a Man with a body and mind. The humanism of medicine has faded to the background. Man is fragmented and his organs, tissues, cells and secretions are subjected to intensive study. That intimate man to man contact of the doctor and patient is fast disappearing. The Doctor of old was the Friend, Philosopher and Guide. He treated the patient; encouraged him. He advised the family on preventive measures; educated them. He was identified as part and parcel of the family. He could even settle family disputes. In short, he had great opportunities of shaping the thoughts of the community he served. At no time was such a contact so badly needed as at present. The rural population of the day are in urgent need of this *Friend, Philosopher and Guide.* The medical men is rapidly becoming a factor of the commercial world, and we have to struggle hard to regain the lost grip on the community we serve. Our young men, will have to go and settle down in the villages at inconvenience, and sacrifice of personal comforts and pecuniary interests. They must become propagandists loosing no opportunity of educating the common man on environmental and personal hygiene. They must study their cases from the point of view of social medicine. Then alone will they succeed in the practice of medicine.

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The increasing number of Psycho-somatic disorders seen at the present day as a result of the ever increasing stress and strain of modern conditions of living bear ample testimony to my views.

Against this background of rapid progress in medicine, what have we done in our country. The record is not altogether what is desired. We are far behind the advanced countries of the West in our standards both preventive and curative. This is due to variety of causes; financial limitations rank foremost; lower standard of general education of our masses whom we serve resulting in poor public co-operation; meagre research facilities; and I am sorry to add the fourth factor, viz., want of team spirit amongst us. Difference between those in government service and in private practice, differences between specialists of different lines, difference between workers of preventive and curative sides, all contribute in a large measure to a lowering of the general standards in spite of the fact that there is no dearth of talent in the country. This has to be urgently remedied. We are now an independent country and have the all important task of building up of a healthy nation for which we must have a well planned programme. It may not be out of place if I mention here, the desirability of having an All-India Health and Medical Service; this will ensure uniformity of medical education and medical service all over the country, corelated research programme and speedier and more efficient tackling of interprovincial problems.

The first requisite in the programme I referred to is an army of well trained and more so, well disciplined workers both medical men and women and paramedical personnel. That naturally leads to the question of medical education. Medical research, practice and education are closely interrelated; yet in the long run it is the standard of medical education that determines standard of practice. Curriculas need rational changes; more attention must be given to practical training than theory. A large number of medical colleges have to be started. In our own State at least two are required; one at Mysore and another at Bangalore. In this connection I must emphatically reiterate the stand that the sooner the L.M.P. is abolished in our State the better; the upgrading of the Medical School, Bangalore into a College is long over due. A wealth of clinical materials available in Bangalore is just being wasted. The established Institutions of Bangalore consisting of the fine General Hospitals and the well established special Institutions like Minto Hospital, the Mental Hospital, the Tuberculosis Sanitoria and the Epidemics Diseases Hospital including Leper Asylum can not only contribute to such a lot to making the College one of the best in India but will themselves benefit greatly in turn. It is my fervent hope that this will be an accomplished fact before we meet for our next annual Conference.

The second requisite is provision of research facilities at least in the teaching and major institutions. Proper men have to be chosen for this job. Research line must be made sufficiently lucrative for it involves considerable sacrifice from those that choose it as a career. Intensification of post-graduate and refresher courses in the major institutions is the third factor of urgent importance. The response to the refresher course arranged at Bangalore by the Association, and its success have only served to emphasise the need for the intensification of such courses.

Talking of medical education and research I must refer to the indigenous systems of medicines. Certain sections of the people in the country demand the resuscitation of indigenous system—Ayurvedic and Unani as well as Homœopathy. In the provision of efficient health service to the country sentiment and emotion have no place. At least as at present understood the allopathic system has the advantage that its concept and interpretation of health and diseases are based on the resources that physical and natural sciences make available to us. This does not mean that intensive research should not be undertaken in the systems of indigenous medicines in the realms of drugs, principles and practices.

Rural medical relief constitutes the most complicated problem for any Government. It is extremely difficult to find medical men who are willing to settle down in interior villages even for a few years. Want of educational facilities in the interior and other even elementary amenities of civilized life are genuine disadvantages which discourage even the most willing worker. It has still to be pursued in a spirit of self-sacrifice and patriotism.

DR. B. R. R. REDDY,
PRESIDENT OF THE CONFERENCE

While talking of institutions, hospitals and the like I must emphatically state that preventive medicine must have equal importance. In fact it is time we realised that this is but one of the specialities of medicine and not a separate entity. A happy combination of preventive and curative medicine is the gist of the success of the profession as a whole. At least in the general practitioner and the rural worker there should be no distinction between the duties curative and preventive; both form integral parts of his work.

A word for Family Planning without which this general talk will not be complete. No amount of emphasis on the urgent need of Family Planning in our country is sufficient. The increase in birth rate is appalling; more so as the food production and other amenities of life are gradually dwindling. A well-planned network of clinics are to be organised and intensive work should be done rather than mere publication of reports.

### RESOLUTIONS PASSED AT THE CONFERENCE

1. That the Senior Surgeon with the Government of Mysore and the Director of Public Health be requested to advise the Health Minister to consult the Mysore Medical Association which is the only representative association of medical men in the State in all matters relating to Medical aid, Public Health and Medical education of the State.

2. To request the Government of Mysore to reserve at least 5 per cent of seats in the University Medical College to children of members of the medical profession.

3. To request the Government of Mysore to give all possible assistance to service personnel who attend the refresher courses which will be run by the Association.

MYSORE ASSOCIATION BUILDING

It is needless to point out the dire necessity of these refresher courses as that is one of the most important measures of keeping the medical man abreast of times.

4. To convert the medical school in Bangalore to college and give greater facilities to the L.M.P.'s to take up the degree course with a view to attain a uniform standard of efficiency.

5. That medical graduates and licentiates be registered in a common list instead of in two separate parts in one list as at present.

6. To institute the system of honorary medical officers in all major hospitals, teaching institutions and district headquarters' hospitals.

7. To request the University of Mysore to abolish the order of enforcing the panel system of treating students of the University as this is not a Residential University and most of the families have their own family doctors and it causes great hardship for an individual member of the family (the student) to go to a separate doctor. if he is not the family doctor.

## I. M. A. CENTRAL COUNCIL

Proceedings of the 73rd Ordinary Meeting of the Central Council of the Indian Medical Association, held at Patna, on 29th December, 1952.

MEMBERS PRESENT:

1. Dr. B. V. Mulay (Sholapur)—President (In the Chair). 2. Dr. T. S. Tirumurti (Madras)—Immediate Past President. 3. Dr. C. S. Thakar (Bombay) Senior Vice-President. 4. Dr. S. C. Sen (New Delhi) Honorary General-Secretary. 5. Dr. A. P. Mittra (New Delhi) Honorary Joint-Secretary. 6. Dr. J. N. Bahadur (New Delhi) Hony. Assistant-Secretary. 7. Dr. S. N. Pd. Agrawal (Samastipur). 8. K. P Agarwal (Darbhanga). 9. Dr. U. B. Narayana Rao (Bombay). 10. Dr. H. V. Upadhye (Dharwar). 11. Dr. B. K. Modak (Kalyan). 12. Dr. D. V. Kulkarni (Nasik). 13. Dr. R. Murti (Dehra Dun). 14. Dr. M. V. Shanbhag (Sagar). 15. Dr. D. D. Prasad (Aurangabad). 16. Dr. R. R. Dhir (Jullundur). 17. Dr. M. M. S. Siddhu (Lucknow). 18. Dr. S. S. Jayaram (Bangalore). 19. Dr. H. S. Lakshminarayana (Tunkur). 20. Dr. D. Krishnamurti (Shimoga). 21. Dr. P. C. Lala (Patna). 22. Dr. S. Samaddar (Patna). 23. Dr. B. K. Vinchure (Nagpur). 24. Dr. P. M. Roy (Dum Dum). 25. Dr. K. K. Seal (Hooghly).26. Dr. L. C. Mitra (Dhanbad). 27. Dr. (Major) H. C. Mallik (Dhanbad). 28. Dr. K. Ganguli (Ghugudhanga). 29. Dr. S. Banerjee (Nabadwip). 30. Dr. D. N. Khandekar (Indore). 31. Dr. S. N. Phathak (Indore). 32. Dr. P. Bhattacharyya (Katihar). 33. Dr. S. R. Sengupta (Calcutta). 34. Dr. P. K. Mallik (Purulia). 35. Dr. L. N. Srinivastava (Allahabad). 36. Dr. L. P. Choudhury (Patna). 37. Dr. N. Das (Kishanganj). 38. Dr. P. C. Duarah (Gauhati). 39. Dr. B. N. Bhattacharjee (Cooch Behar). 40. Dr. J. H. Kunchur (Sangli). 41. Dr. V. H. Tilak (Satara). 42. Dr. A. N. Ghosh (Calcutta). 43. Dr. T. N. Ghosh (Calcutta). 44. Dr. S. K. Ghosh Dastidar (Patna). 45. Dr. P. B. Mukerji (Calcutta). 46. Dr. H. V. Tilak (Bombay). 47. Dr. R. K. Malhoutra (Amritsar). 48. Dr. P. Lall (Delhi). 49. Dr. F. C. Shori (Amritsar). 50. Dr. V. N. Ananda Theertha (Bangalore). 51. Dr. D. V. Chapekar (Gadag). 52. Dr. W. R. Korpe (Akila). 53. Dr. (Miss) L. Raj (New Delhi).

1. *Confirmation of the Proceedings of the Annual Meeting of the Central Council, held at Patna, on 23rd, 24th and 25th December, 1952.*

The Proceedings of the 13th Annual Meeting of the Central Council (circulated to members). held on 23rd, 24th and 25th December, 1952, at Patna, were duly confirmed.

2. *Delegation of all or some of the powers of the Central Council, to the Working Committee:*

The following resolution was duly moved, seconded and passed unanimously by the House:—

"Resolved that the Central Council delegates to the Working Committee all its powers and functions, excepting the power of changing the Rules, for the year 1952-53, according to Rule No. 12C(g) of the Indian Medical Association."

3. *Any other business with the permission of the President.* Nil.

The meeting came to a close with a vote of thanks to the Chair.

Sd./ S. C. SEN,
*Hony. General-Secretary.*

Sd./ B. V. MULAY,
*President.*

## BRANCH NOTES

**ASSAM PROVINCIAL BRANCH**—An emergent meeting of the Working Committee of the branch was held on 2-3-53 with Dr. P. N. Ghose in the chair. Seven members were present. Proceedings of the last W. C. meeting, the 3rd annual council meeting and the 4th Assam Provincial Medical Conference were confirmed. The secretary informed the house that Dr. S. C. Das of Jorhat had been selected for study abroad by the Central I.M.A., also that one doctor had been sent abroad for training in drugs analysis and toxicology by the Government.

**ASSAM PROVINCIAL MEDICAL CONFERENCE (4th)**—In the scientific session of the conference, 16th papers were read; 2 in surgery, 2 in ophthalmology, 2 in gynæcology, 7 in medicine and 3 in public health.

**BANGALORE BRANCH**—A clinical meeting of the branch was held on 11-3-53. Dr. T. Manickam spoke on "Otolaryngology in general practice." Dr. Laksham Rao Phadke presided. Forty members were present.

**BERHAMPORE MEDICAL ASSOCIATION**—The annual general meeting of the branch was held on 15-3-53. The report of the secretary for 1952 was accepted. Office-bearers for 1953 were elected with Dr. S. N. Bhattacherjee as president and Dr. A. B. Majumdar as secretary.

**BERHAMPORE (GANJAM) BRANCH**—A meeting of the branch was held on 18-4-53 to place on record its deep sense of sorrow at the sad and untimely death of Dr. Jagadish Chandra Durta under tragic circumstances. He was the joint secretary of the Orissa State Branch.

**BHOWALI BRANCH**—A meeting of the branch was held on 15-2-53 with Dr. R. L. Nagar in the chair. Eight members were present. Dr. G. D. Agrawal introduced the subject of B.C.G. vaccination in the form of a resolution which was discussed by the members. In the working committee meeting of the branch, some rules of the branch were amended.

The half-yearly report of the branch shows that 5 general meetings were held. In the meeting, the following papers were read: (a) Surgical procedures in pulmonary tuberculosis (b) Observations on 50 cases of isonicotinic acid hydrazid (c) Pregnancy and tuberculosis.

**CACHAR BRANCH**—A meeting of the branch was held on 28-3-53 with Dr. J. N. Chakraborty in the chair. Fourteen members were present. Dr. D. L. Biswas read the following case notes (1) peculiar urticarial rash where all antihistaminic treatment failed but was cured with autohæmotherapy. (2) Tetanus in 6 newborn babies in a locality where delivery was done by the same dhai. No fresh case arose with the change of dhai.

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A meeting of the branch was held on 25-4-53. Dr. J. N. Chakraborty presided. Thirteen members were present. After the normal business was over, Dr. S. K. Datta read notes of a case of pulmonary amœbiasis showing all signs of pulmonary T. B. and frank hæmoptysis. The members also recorded its deep sense of sorrow at the sudden death of Dr. A. K. Sen, ex-vice-president of I.M.A.

**CALCUTTA BRANCH**—A condolence meeting of the branch was held on 11-4-53 in which the general members of the medical profession and the members of the branch expressed their most profound sorrow and sense of irreparable loss at the sad and untimely demise of Dr. Anil Kumar Sen, ex-president of the branch and ex-vice-president of I.M.A., Bengal and India.

**THE COIMBATORE DISTRICT MEDICAL ASSOCIATION**—A meeting of the association was held on 29-3-53 with Dr. P. N. Ramaswami Naidu in the chair. Seventy-five members attended. Condolence resolutions were passed on the death of Dr. K. Pratap and Dr. R. Ramachandra Rao, members of the association and of Dr. Rathnaswami of Madras. Then Dr. (Mrs.) Anna Vareed spoke on "Hazards and management of prolonged labour." There was also a film show.

**DEHRA DUN BRANCH**—A meeting of the branch was held on 3-3-53. Dr. Mitranand was in the chair. Twenty-three members were present. Dr. Ram Murti gave an interesting lecture on "Chloromycetin in typhoid fever".

**DHARWAR BRANCH**—The branch celebrated the World Health Organisation Day on the 7th April 1953 by a suitable programme.

**DOOARS BRANCH**—The annual general meeting of the branch was held on 15-3-53 with Dr. G. N. De in the chair. Lt.-Col. J. Hay Arthur inaugurating the meeting said that medical men should organise health lectures for the lay public. Dr. S. N. Das Paul, Chairman, reception committee narrated the medical arrangements of Dooars for the past 40 years. Office-bearers were elected with Dr. G. N. De as president and Dr. N. C. Bagchi as secretary for 1952-53. The following papers were read at the meeting (1) Malaria and its control by J. Hay Arthur (2) Small blood transfusion by Dr. P. N. Deb (3) Infantile diarrhœa by Dr. H. K. Sanval (4) Management of premature babies by Dr. B. N. Das Gupta.

**EAST GODAVARI BRANCH**—A meeting of the branch was held on 21-2-53. Dr. B. Veerarazu spoke on "Congestive heart failure". Dr. C. Sanyasiraju dealt with the history of medicine which was very interesting. Dr. Ammu read case reports of various manifestations of amœbiasis.

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A meeting of the branch was held on 28-3-53. Dr. B. Venkataraju spoke on the treatment of large hernia. Dr. Prakasarao described what diseases follow dental sepsis and how to prevent them. Dr. Krishnamurthy gave two case reports of pregnancy after menopause. Dr. M. V. Rajasekhararao demonstrated a case of unsuspected yaws.

**FAIZABAD BRANCH**—A special meeting of the branch was held on 23-3-53. Col. A. N. Chopra, Director of Health Services, U.P. and Dr. Chatterjee and Dr. B. Gopal, Dy. Directors attended on invitation. Dr. Y. D. Dapur stressed the need of opening a T.B. sanitorium at Faizabad and requested a reduction in the hospital laboratory examination charges and the opening of an antinatal clinic.

**GHUGUDANGA BRANCH**—A meeting of the branch was held on 19-4-53. Dr. Sarat Sashi Sarker presided. Four members were present. After the routine business was over Dr. Sunil Dutta delivered an interesting lecture on "General Anasarca", followed by a general discussion.

**GURDASPUR BRANCH**—A meeting of the branch was held on 5-4-53. Dr. Jagjit Singh was in the chair. Thirty doctors were present. Dr. Tej Nath Kanshal spoke on Infanthe Diarrhœa and artificial feeding.

**HASSAN BRANCH**—A clinical meeting of the branch was held on 29-3-53. Dr. A. R. Sundar Rao was in the chair. Forty doctors were present. Dr. S. C. Kuppanna gave an interesting talk on the radiological aspect of some children's diseases with demonstration slides. Dr. H. R. R. Iyengar read case reports on tetanus, snake-bite and on epidemic of gastro-enteritis. Dr. D. Shamanna demonstrated an operated case of meningocele in a new born baby and compound depressed fracture of the skull in an adult.

**HASSAN BRANCH**—A meeting of the branch was held on 29-3-53. Dr. Nirmal Perkash presided. Dr. K. C. Wohra read a paper on population and family planning.

**JABALPUR BRANCH**—A meeting of the branch was held on 13-4-53 to place on record its deep sense of sorrow at the sad demise of Dr. N. K. Neogy and send messages of sympathy to the bereaved family.

**KISHANGANJ BRANCH**—A meeting of the executive committee of the branch was held on 7-9-52 under the presidency of Dr. S. Kumar. Nine members were present.

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The annual general meeting of the branch was held on 26-10-52 with Dr. H. Sahai in the chair. The secretary's report for 1951-52 was adopted, office-bearers for 1952-53 were elected with Dr. S. Kumar as president and Dr. N. G. Das as secretary.

**MADURA MEDICAL ASSOCIATION**—The Silver Jubilee of the association was celebrated on the 21st and 22nd February, 1953. On 21-2-53, Dr. M. N. Rajan presided. Dr. U. Krishna Rao delivered the Jubilee inaugural address. Sri K. Thiagarajan Chettiar, Managing Director of Sree Meenakshi Mills Ltd. declared open the association buildings. On the 22nd February, a scientific session was held. Dr. R. V. Rajan spoke on "The newer concept of treponemal diseases"; Dr. A. Srinivasan on "cardiac arrythmia"; Dr. U. Mohan Rau on "clinical significance of hæmaturia", Dr. Henry Osmond Clarke and Rigler belonging to the team of International Medical Experts who attended the function on invitation also spoke in the meeting, the former on fracture treatment" and the latter on "carcinoma of the stomach".

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The annual general meeting of the association was held on 21-2-53 with Dr. M. N. Rajan in the chair. At the outset, the members placed on record its deep sense of sorrow at the death of Lt.-Col. Leslie, ex-district medical officer, Madura. The annual report and the statement of accounts were passed. Names of new office-bearers were announced. Dr. A. S. Annamalai was elected the president and Dr. P. A. Y. Narayanan, the secretary. The meeting requested the authorities to relax the rules governing the grant of licenses for the possession of methyl alcohol which is indispensable to the profession.

**MALABAR BRANCH**—A meeting of the branch was held on 21-3-53 with Dr. C. K. Menon in the chair. At the outset, the members condoled the death of Dr. K. R. P. Chidambaram and Dr. P. S. Subramanya Iyer. Dr. C. R. Parasuram read an interesting paper on "The value of rectal examination in general practice."

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A meeting of the branch was held on 18-4-53 with Dr. C. K. Menon in the chair. Dr. T. Balakrishnan presented a report on "The surgical work of the Asoka Hospital in 1952". The Committee was authorised to take steps to collect funds for a permanent building of the branch.

**MALEGAON BRANCH**—A meeting of the branch was held on 13-1-53 to offer congratulations to Dr. Mohomad Daleem Shaikh one of the members of the branch on his being elected as president of the Malegaon Municipal Burroughs.

**MORVI MEDICAL UNION**—A meeting of the Union was held on 12-4-53 with Dr. P. D. Raval in the chair. Eleven members were present. Dr. D. G. Dave spoke on his experience of the 6th Gujarat and Sourashtra Prov. Conference.

**MYSORE BRANCH**—The report of the branch for 1-10-52 to 31-3-53 shows that membership of the branch has increased from 8 to 93.

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The annual general body meeting of the branch was held on 4-10-52. Dr. M. L. Mariswamy presided. The report of the branch from 30-1-52 to 30-9-52 and the annual accounts were accepted. Office-bearers for 1952-53 were elected with Dr. V. R. Naidu as president and Dr. P. D. Krishnaswami as secretary.

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A clinical meeting of the branch was held on 29-11-52. (1) Dr. Radha Bai Moray demonstrated two cases of advanced carcinoma of the breast; (2) Dr. S. Narayanasetty demonstrated skiagrams chest to show the importance of selection collapse of the affected lung in pulmonary tuberculosis besides the administration of antibiotics; (3) Dr. Basavaragura demonstrated a case of an adult showing pigmentation (black) of the palms of the hands and soles of the feet.

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A clinical meeting was held on 2-1-53. Dr. K. S. Ranganathan, Director, B.C.G. Vaccine Institute, Madras, spoke on the importance of the B.C.G. vaccination.

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A special meeting of the branch was held on 2-1-53 in which delegates were elected to the annual conference of the branch. Dr. V. R. Naidu presided.

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A clinical meeting was held on 28-2-53. Dr. F. I. Tovey presided. Dr. S. V. Govindasetty demonstrated (1) a case of aneurysin of the innominate artery in a female of 30, (2) a case of pericarditis in a male of 40. A case of bilateral cervical rib in an adult male was demonstrated by Dr. T. C. Chandrasekhar and discussed by Dr. R. Audikesaoalu. Dr. Tovey demonstrated (1) the case of an adult male who showed a mark of stenosis of the bladder causing dysuria and burning micturition (2) the case of a boy who sustained traumatic amputation of both the forearms set right by bilateral knikenfery stump operation (3) a case of [illegible] gastric ulcer secondary to pyloric stenosis and distended stomach and another case of anastomotic ulcer following gastrojejunostomy.

**NIZAMABAD BRANCH**—A meeting of the branch was held on 30-3-53 under the presidentship of Dr. L. R. Despande. Dr. R. N. Nadkarni delivered a lecture on clinical approach to general fevers.

**PANDUA THANA BRANCH**—The 4th anniversary of the branch was held on 22-3-53. Dr. J. N. Chatterjee, president of the branch in his welcome address mentioned the various difficulties of a village practitioner. He also explained the reasons why qualified medical men are not inclined to go to villages for practice and quoted in support, from the presidential address of Dr. Mulay. He also suggested that sons of rural practitioners be given some preference regarding admission into the medical college. He mentioned the increasing ravages of tuberculosis in the villages and the inadequate relief in this matter. He suggested that curative units should work the preventive scheme also. He spoke of adulteration of foodstuff and adulterated medicine in the country. He appealed for abolishing sales tax from all medicinal preparations as well as from medical publications. He drew attention of the medical men to the fact that certificates from registered medical practitioners are sometimes ignored by the Government institutions which should cease now. Lack of sufficient attention to patients in hospitals was also referred to by him for investigation and redress.

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The annual report of the branch for 1952-53 shows that there were 28 members on the roll. Eleven monthly meetings were held during the year. In the last annual meeting, a symposium on malaria was arranged and Dr. J. C. Banerjee spoke on P.U.Os. and their differential diagnosis. On different occasions, Major H. K. Indra gave a talk on common eye diseases, Dr. B. Kumar demonstrated an unusual case of scalenus anticus syndrome; Dr. S. A. Rahman and Dr. B. Roy demonstrated cases from day to day practice. The branch is trying to organise a chest clinic.

**PORBANDAR BRANCH**—A clinical meeting of the branch was held on 12-4-53 with Dr. H. H. Chavda in the chair. Twenty-two members were present. Dr. M. C. Sanghair spoke on "Some Notes on Allergy", Dr. K. D. Dave read a case report on "Pluracy with effusion with spontaneous pneumo thorax."

**SAHABAD BRANCH**—A meeting of the branch was held on 5-4-53. Twelve members were present. Regarding the improvement of health and sanitation of the Arrah town, a sub-committee was formed to formulate a plan for submission to the municipal board for implementation.

**SHIMOGA BRANCH**—A meeting of the branch was held on 4-4-53 with Dr. B. N. Rajagopal in the chair. A talk on the role of medical man in the community project by Dr. C. S. Seshadri was discussed at the meeting.

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The Public Liaison Committee of the branch met the representatives of the press on 4-4-53 night and discussed some problems viz., advertisement in lay press of drugs of high potence (2) publication of medical professional news in an unwarrantedly sensational manner (3) undue publicity given to magic cures and relief camps run on no scientific basis. Dr. Krishnamurthy drew pointed attention of the press to the blind relief camps that are coming up all over the State in mushroom fashion.

**SITAPUR BRANCH**—The annual meeting of the branch was held on 31-1-53 with Dr. B. L. Srivastava in the chair. Office-bearers were elected with Dr. F. L. Srivastava as president and Dr. B. B. L. Srivastava as secretary.

**TANJORE DISTRICT BRANCH**—A meeting of the branch was held on 22-2-53 with Dr. N. R. Subramanian in the chair. Fifty-five members were present. Dr. B. G. Shenoi read a paper on "Injuries of the head and chest". A case of depressed fracture of the skull was demonstrated.

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A meeting of the branch was held on 22-3-53 with Dr. N. R. Subramanian in the chair. Seventy doctors were present. It was decided not to invite the Provincial Conference to Tanjore, due to unavailability of accommodation. Dr. K. Vasudeva Rao spoke on the "Use and abuse of the wonder drugs in tuberculosis".

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At the general body meeting of the branch held on 3-4-53, office-bearers for 1953-54 were elected with Dr. N. R. Subramanian as president and Dr. S. Narayanan as secretary.

**TENALI BRANCH**—A meeting was held on 28-3-53. The following clinical cases were demonstrated, (1) a case of ascitis for which laparatomy was done, (2) a case of small tumour in the left masseter region, (3) a case of retro-faucial tumour on the right side in a woman (4) a case of multiple sinuses in the right inguinal region due to lymphogranuloma inguinale (5) a case of hydrocephalus. Next a symphosium on family planning was opened by Capt. K. V. R. Choudari.

**TIRUNELVELI DISTRICT MEDICAL ASSOCIATION**—A meeting of the association was held on 28-2-53. Thirty-seven members were present. After the routine business Dr. K. Rama Ayyar spoke on "Acute appendicitis".

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A meeting of the association was held on 28-3-53. Thirty-seven members were present. Dr. P. R. Acharya read a paper on the "Obstetrician's bag".

**TRAVANCORE-COCHIN MEDICAL ASSOCIATION**—In the annual business meeting of the association held on 22-11-53. Dr. C. O. Karunakaran was elected the president for 1952-53 and Dr. R. Kesavan Nair, the secretary. The annual report of the Association for the previous year showed that it had 10 branches with about 500 members and all branches held regular professional meetings.

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The annual report of the Association for the year 1951-52 shows that membership rose from 441 to 493. There were 4 meetings of the Provincial Council in which were considered (1) Import of drugs and instruments. (2) The first Five Year Plan (3) Draft of the new Travancore-Cochin Medical Practitioners' Act (4) Inclusion of modern medical subjects in the syllabus in Ayurvedam. There were also 3 special meetings during the year.

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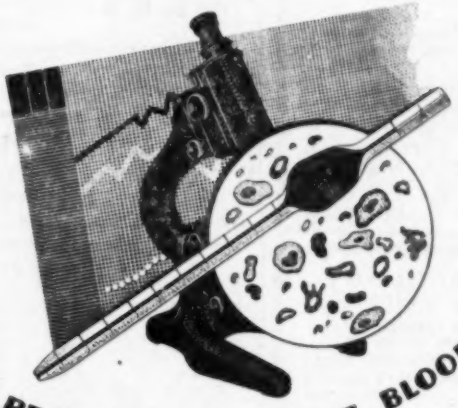

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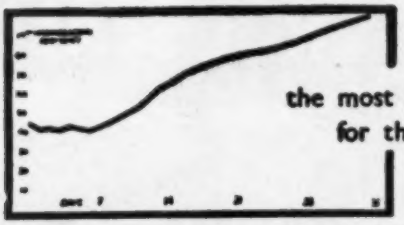

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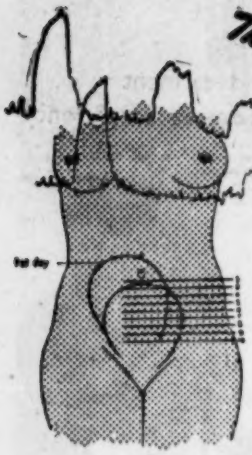

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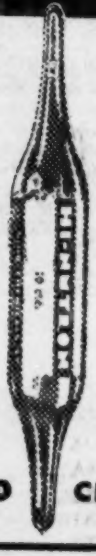

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